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April 1953

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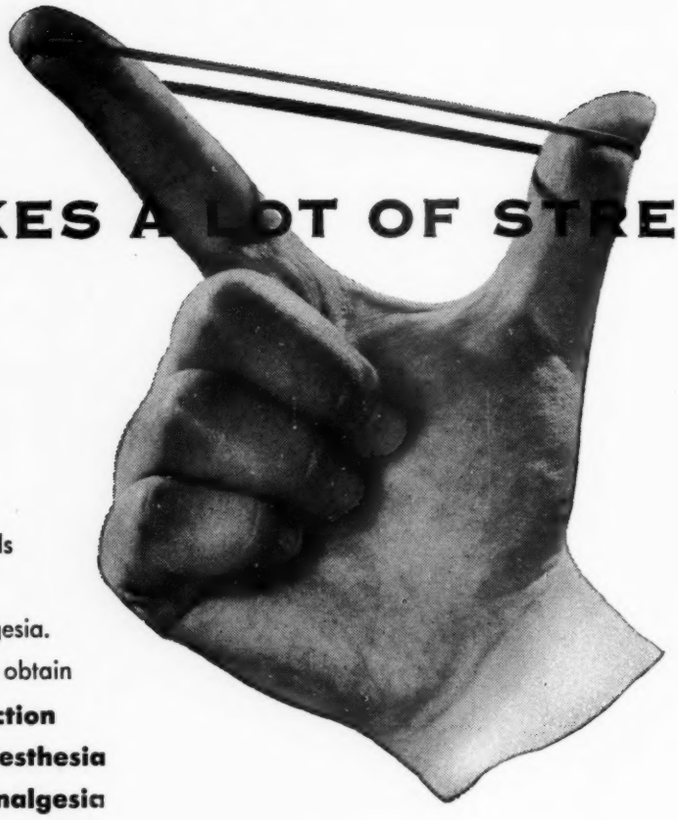

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MALIGNANT TUMORS ORIGINATING IN MECKEL'S DIVERTICULUM. CASE REPORT OF A LEIOMYOSARCOMA AND REVIEW OF THE LITERATURE . . . . . *Frederick A. Hill and Donald E. Janelli* 525

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Usefulness of Alidase® for Prompt Fluid Absorption

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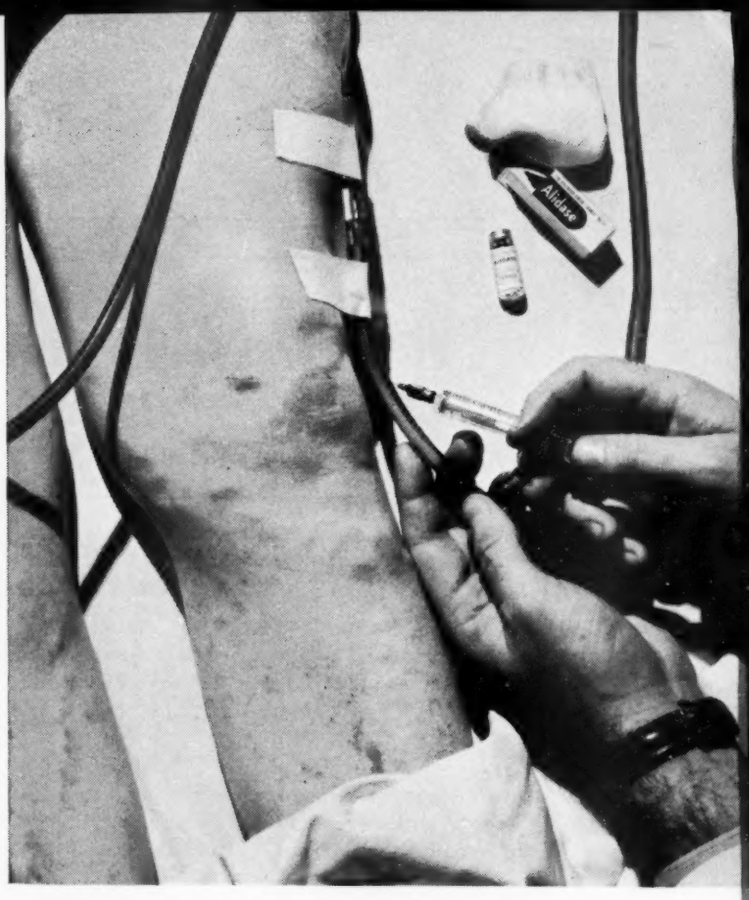

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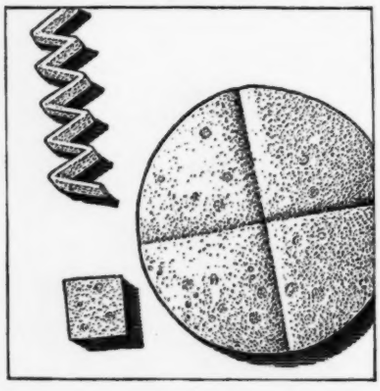

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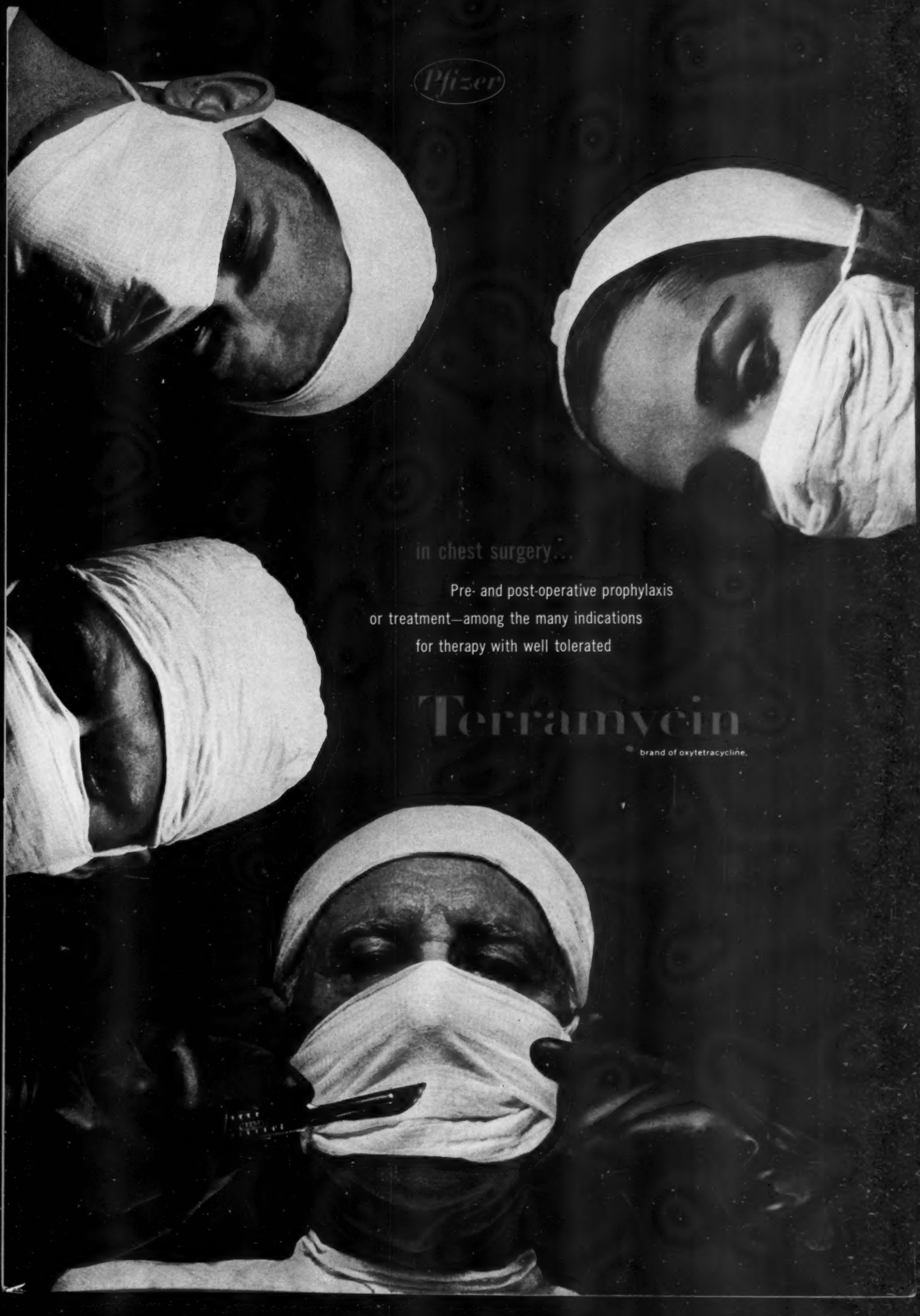
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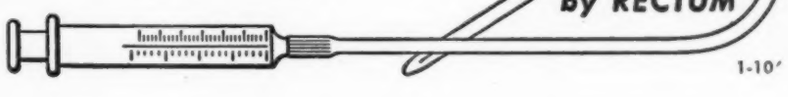

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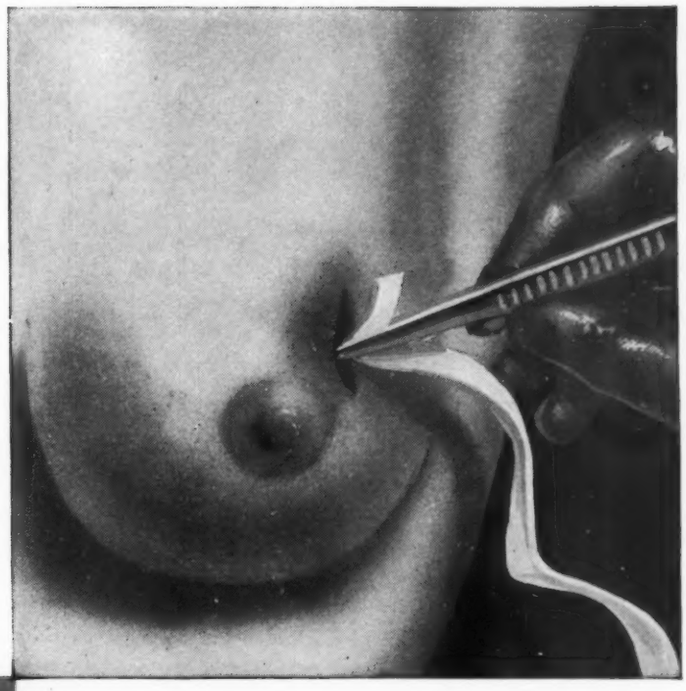

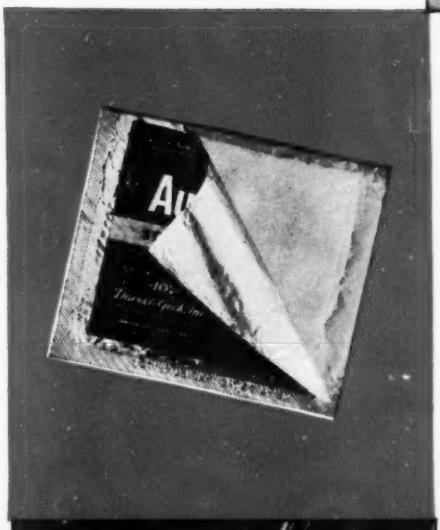

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*From a series of 17 patients treated with mephentermine. Hellerstein, H.K.; Brofman, B.L. and Caskey, W.H.: Shock Accompanying Myocardial Infarction; Treatment With Pressor Amines. Am. Heart J. *44*:407 (Sept.) 1952.

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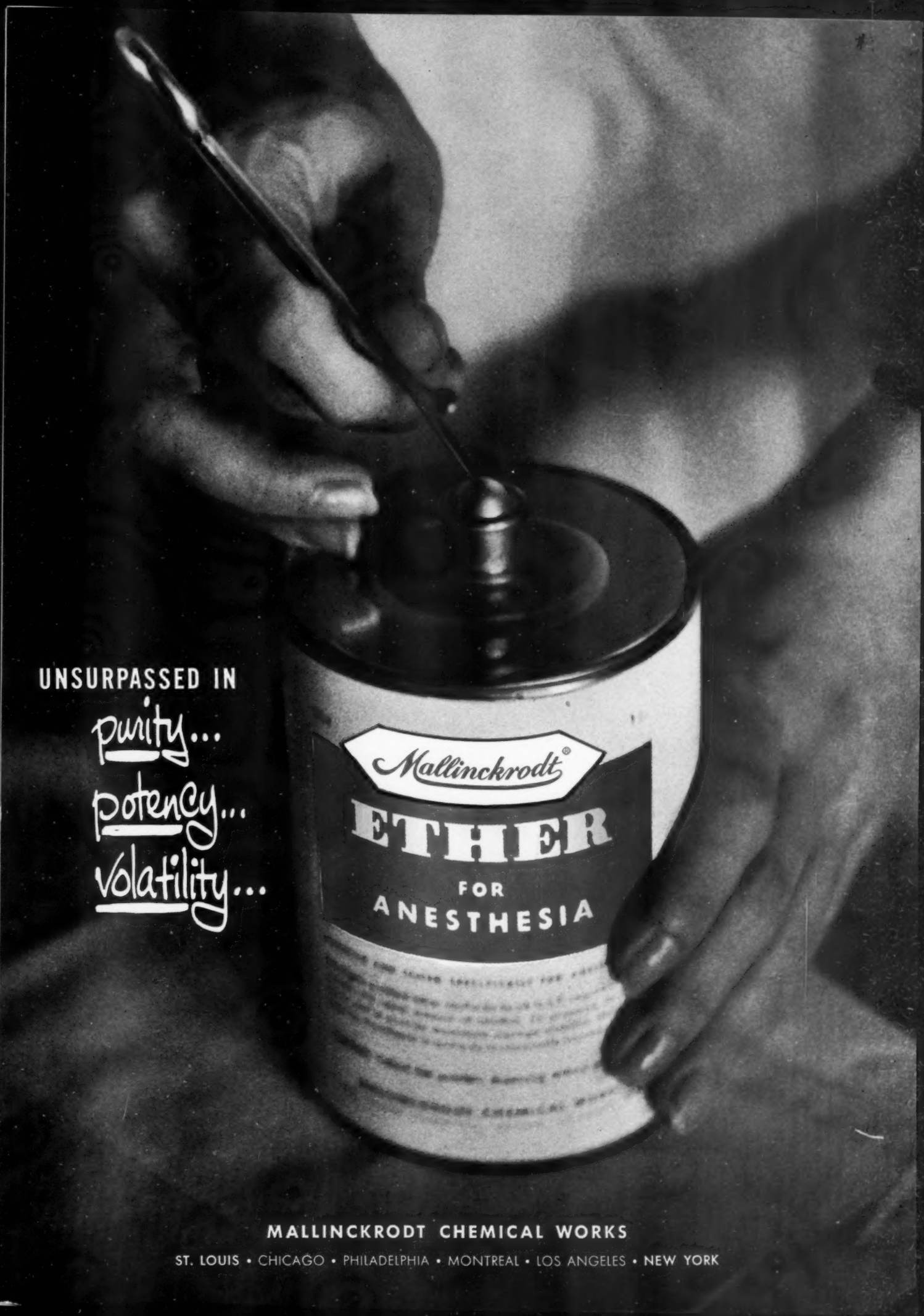

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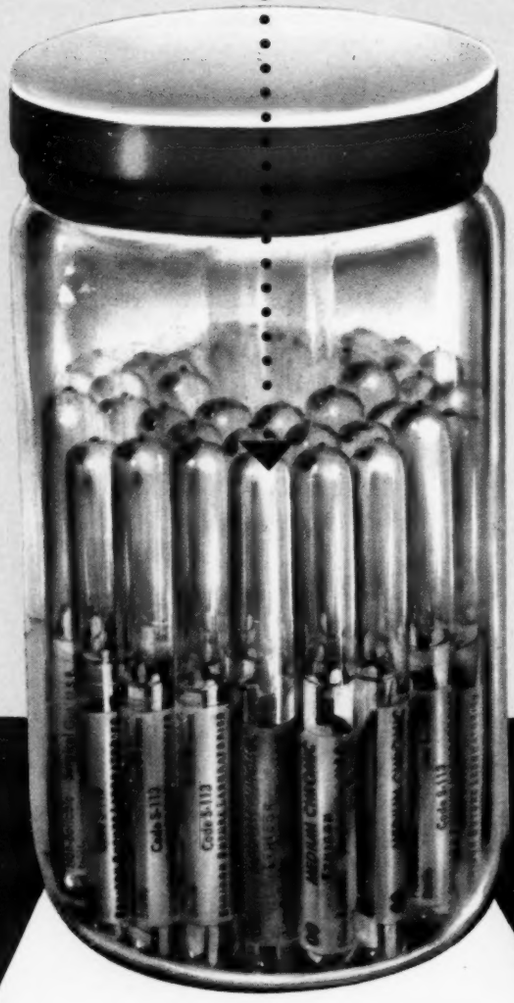

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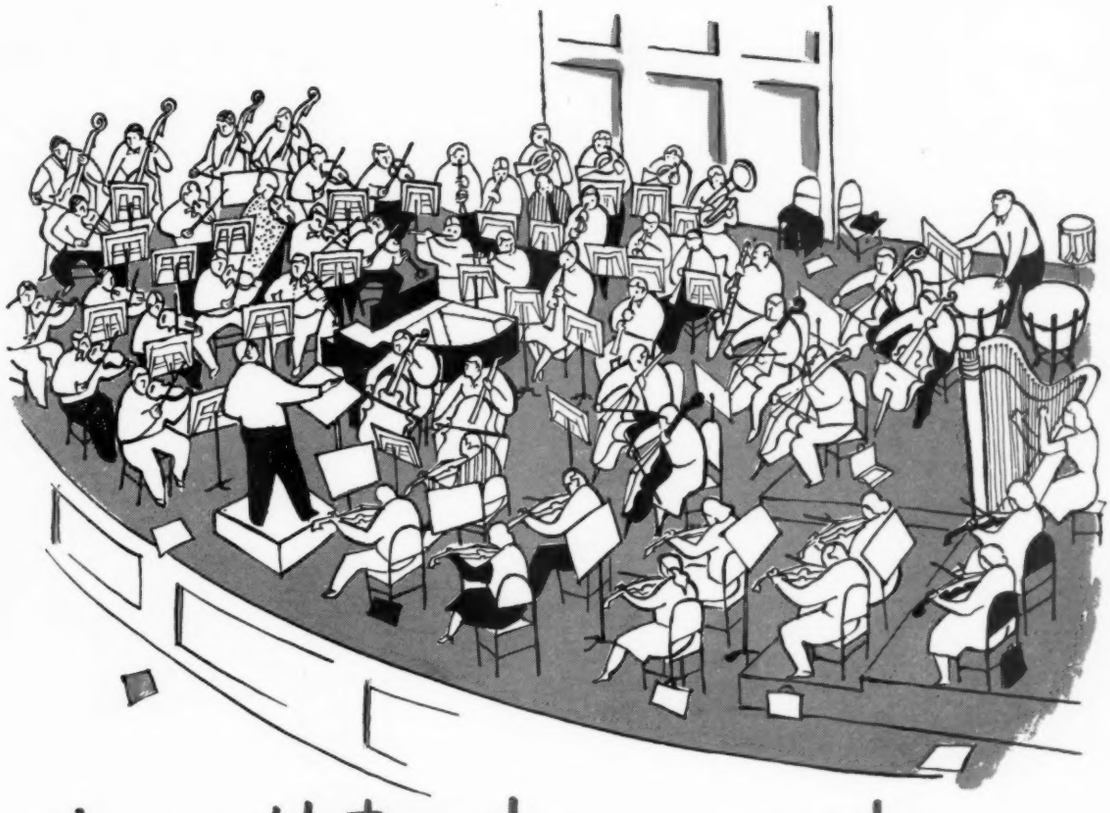

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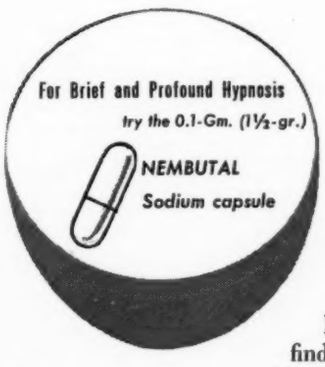

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Tulloch, J. A., and Gilchrist, A. R.: Am. Heart J. *42*:864, 1951.

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Burke, G. E., and Wright, Irving S.: Circulation *3*:164, 1951.

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Bramwell, C.: Practitioner *167*:366, 1951.

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Bibliography

(1) Barker, N. W.; Estes, J. E., Jr., and Mann, F. D.: Proc. Staff Meet., Mayo Clin. *26*:162, 1951. (2) Bickel, G., and Della Santa, R.: Rev. med. de la Suisse Rom. *69*:546, 1949. (3) Bifoni, A., and Casolo, P.: Policlinico *57*:1481, 1950. (4) Brandes, J.; Cloetens, W.; Habay, G., and Mascart, Ph.: Acta clin. belg. *5*:356, 1950. (5) Brodie, B. B.; Weiner, M.; Burns, J. J.; Simson, G., and Yale, E. K.: J. Pharmacol. & Exper. Therap. *106*:453, 1952. (6) Bronstein, M. R., and Witkind, E.: Am. J. M. Sc. *222*:677, 1951. (7) Burke, G. E., and Wright, Irving S.: Bull. New York Acad. Med. *26*:264, 1950. (8) Burke, G. E., and Wright, Irving S.: Trans. Third Conference, Josiah Macy, Jr. Foundation, New York, 1950. (9) Burke, G. E., and Wright, Irving S.: Circulation *3*:165, 1951; abstracted, M. Times *10*:657, 1951. (10) Burt, C. C.; Wright, P., and Kubik, M.: Brit. M. J. *11*:1250, 1949. (11) Castex, M. R.; Pavlovsky, A.; Castellanos, H., and de Mittelman, D. G.: Prensa med. argent. *37*:1695, 1950. (12) Cataldi, R.: Inform. med., Genova *4*:299, 1950. (13) Debennetti, V., and Limone, G.: Sett. med. *38*:346, 1950. (14) Della Santa, R.: Schweiz. med. Wchnschr. *79*:195, 1949. (15) Della Santa, R., and v. Kaulla, K. N.: Helvet. med. acta. *16*:251, 1949. (16) Deutsch, E.: Schweiz. med. Wchnschr. *79*:1010, 1949. (17) Deutsch, E., and Heuber, E. F.: Wien. klin. Wchnschr. *62*:277, 1950. (18) Duff, I. F., and Linman, J. M.: J. Michigan M. Soc. *49*:1428, 1950. (19) Domanig, E.: Wien. klin. Wchnschr. *63*:478, 1951. (20) Enria, G., and Ferrero, R.: Arch. Sci. Med. *91*:1, 1951. (21) Favre-Gilly, J.; Froment, R.; Gonin, A.; Ithier, S., and Borel-Michet, F.: Bull. et mém. Soc. méd. d. hôp. de Paris *67*:353, 1951. Also Echos Med. *22*:1, Nr. 13, 1951. (22) Fetzer, E.: Med. Klin. *45*:1497, 1950. (23) Fonio, E.: Schweiz. med. Wchnschr. *80*:1095, 1950. (24) Froment, R.; Gonin, A.; Cahen, P.; Ithier, S.; Brette, R., and Richard, M.: J. de méd. de Lyon *31*:953, 1950. (25) Giannico, O.: The Thrombogenic Diathesis, Rome, L. Pozzi, 1950. (26) Gloor, F., and Sigg, B.: Praxis *39*:839, 1950. (27) Gruber, C. M., Jr.; Gruber, C. M.; Lee, K. S., and Lasziczenko, Z. I.: Federation Proc. *10*:303, 1951. (28) Hausner, E. P.; Shafer, C. L.; Corson, M.; Johnson, O.; Trujillo, T., and Langsam, W.: Circulation *3*:171, 1951. (29) von Heuber, E. F.: Cardiologia *17*:223, 1950. (30) Hunter, R. B.: Proceedings of the Medical Research and Scottish Society for Experimental Medicine, July 1950. (31) Jentzer, A., and Clerc, R.: Presse méd. *58*:1365, 1950. (32) von Kaulla, K. N., and Pulver, R.: Schweiz. med. Wchnschr. *78*:206, 1948. (33) von Kaulla, K. N.: Deutsche med. Wchnschr. *75*:1259, 1950. (34) De Keyser, R.: New Prospectives in Anticoagulant Therapy, Geneesk, gids. *27*:223, 1949. (35) Krcilek, A.; Tion, F., and Zavodny, F.: Casop. lék. česk. *89*:546, 1950. Ref. Presse méd. *59*:12, 1951. (36) Krenzer, W.: Neue med. Welt *1*:960, 1950. (37) Kubik, M., and Wright, H. P.: Proceedings of the International Congress on Hematology, Cambridge, 1950. (38) Lisny, I., and Polacek, L.: Casop. lék. česk. *88*:115, 1949. (39) Lian, C.; Siguier, F.; Welti, J. J.; Coblentz, B., and Trelat, J.: d. hôp. Paris *27*:1501, 1951. (40) Lian, C.; Siguier, F.; Welti, J. J.; Piette, M.; Coblentz, B., and Trelat, J.: Bull. et mém. Soc. méd. d. hôp. de Paris *66*:110, 1950. (41) Lian, C.; Siguier, F.; Welti, J. J.; Piette, M.; Poullain, P., and Philippon, J.: Semaine d. hôp. Paris *27*:1505, 1951. (42) Marple, C. D.: California Med. *73*:425, 1950. (43) Marple, C. D., and Wright, Irving S.: Thromboembolic Conditions and Their Treatment with Anticoagulants (monograph), Charles C. Thomas, Springfield, Ill., 1950. (44) Mininni, G., and Scardigli, G.: Sett. med. *38*:26, 1950. (45) Mueller, M., and Jonkmans, J.: Geneesk. gids. *28*:495, 1950. (46) de Nicola, P.: Il Farmaco *4*:152, 1949. (47) Olivior, C.: Semaine d. hôp. Paris *27*:892, 1951. (48) Petracek, E.: Casop. lék. česk. *83*:1204, 1944. (49) Petracek, E.: Casop. lék. česk. *20*:683, 1945. (50) Pulver, R., and von Kaulla, K. N.: Schweiz. med. Wchnschr. *78*:956, 1948. (51) Rejsek, K., and Kubik, M.: J. Clin. Path. *2*:55, 1949. (52) Reinis, Z.: Presse méd. *58*:475, 1950. (53) Reinis, Z., and Kubik, M.: Schweiz. med. Wchnschr. *78*:785, 1948. (54) Rosicky, J.: Casop. lék. česk. *83*:1200, 1944. (55) Salsova: Lék. listy. 1948. (56) Scardigli, G., and Mininni, G.: Sett. med. *37*:530, 1949. (57) Schmid, J., and Stockinger, L.: Wien Z. inn. Med. *32*:67, 1951. (58) Smith, F. J.: J. Michigan M. Soc. *49*:1401, 1950. (59) Solomon, C.; McNeile, H. J., and Lange, R.: J. Lab. & Clin. Med. *36*:19, 1950. (60) Strombeck, A. P.: Nord. Med. *43*:944, 1950. (61) Weiner, M.; Simson, G.; Burns, J. J.; Shapiro, S.; Klein, E. L., and Brodie, B. B.: Federation Proc. *10*:344, 1951. (62) Wright, H. P.: J. Obst. & Gynec. *58*:273, 1951. (63) Wright, Irving S.: Modern Med. *19*:55, 1951. (64) Wright, Irving S.: Mil. Surgeon *108*:113, 1951. (65) Wright, Irving S.; Burke, G. E., and Scarrone, L. A.: Neue med. Welt. *20*:1469, 1951. (66) Wright, Irving S.; Sorenson, C. W., and Burke, C. B.: American Heart Association, San Francisco, Calif., June 23, 1950.

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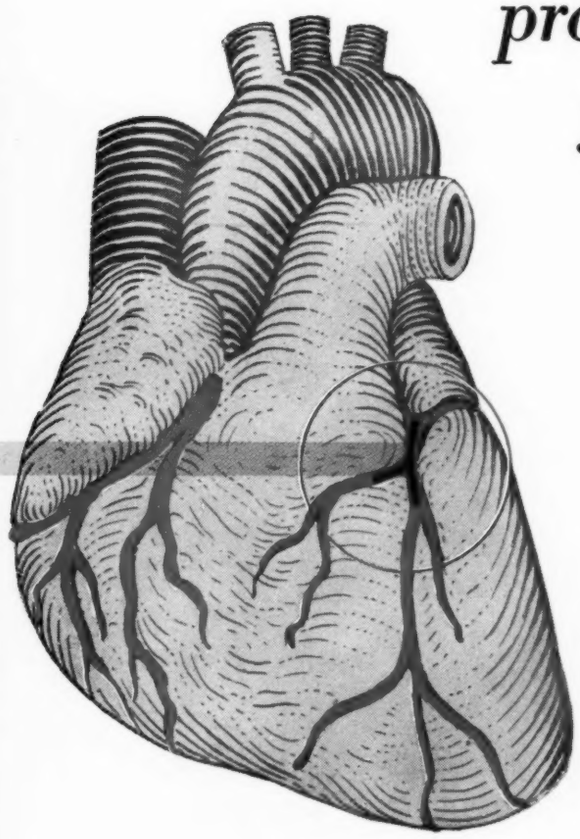

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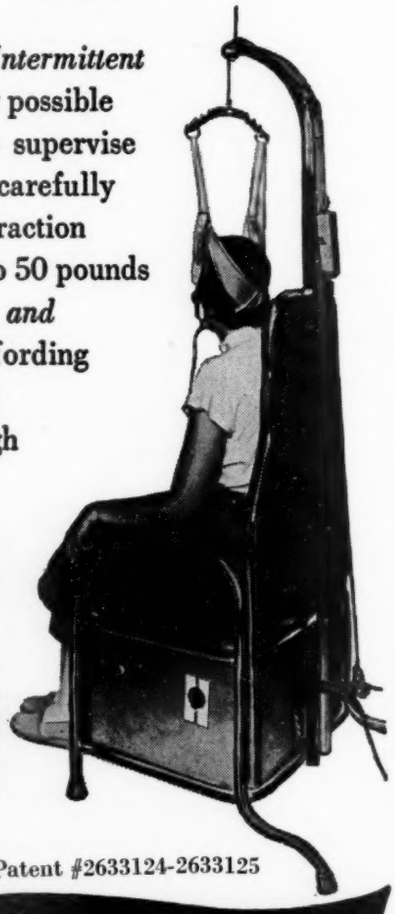

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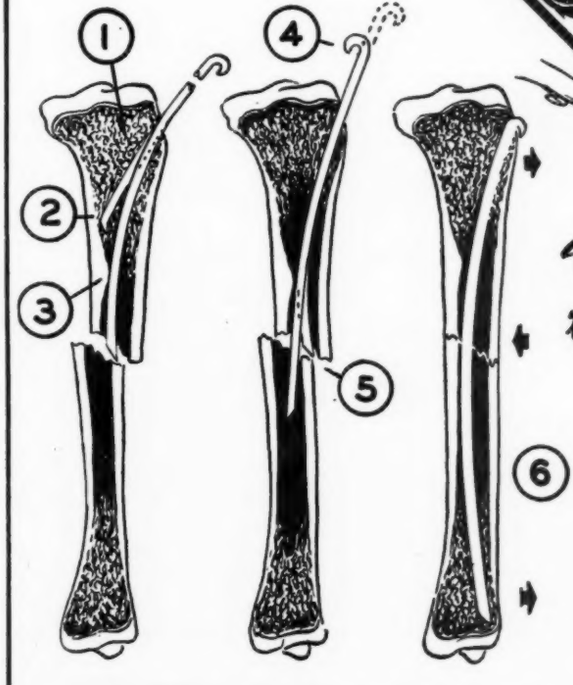

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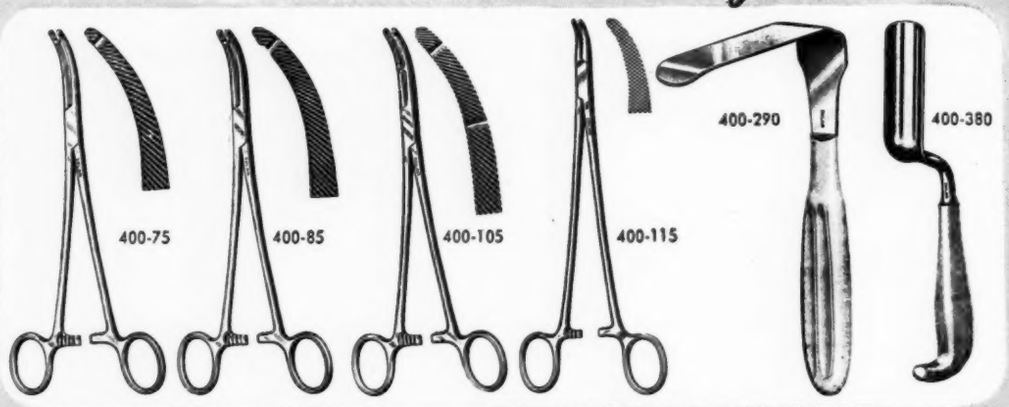

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3. Temporal branch of facial nerve
4. External carotid artery & posterior facial vein
5. Superficial cervical lymph nodes
6. External jugular vein
7. Accessory nerve & internal carotid artery
8. Platysma muscle
9. Fourth cervical nerve
10. Superior position of sternocleidomastoid muscle
11. Deep cervical lymph nodes
12. Fifth cervical nerve
13. Posterior supraclavicular nerve & anterior jugular vein
14. Superficial cervical artery & vein
15. Middle supraclavicular nerve & subclavian artery
16. Transverse scapular artery & vein
17. Inferior position of sternocleidomastoid muscle
18. External maxillary artery & anterior facial vein
19. Submaxillary lymph nodes & digastric muscle
20. Submaxillary gland & mylohyoid muscle
21. Submental lymph nodes & hypoglossal nerve
22. Superior laryngeal artery & nerve
23. Superior cervical ganglion
24. Superior laryngeal vein & omohyoid muscle
25. Superior thyroid artery & vein
26. Ansa hypoglossi
27. Common carotid artery & sternothyroid muscle
28. Middle cervical ganglion & phrenic nerve
29. Vagus nerve
30. Thyroid gland & middle thyroid vein
31. Internal jugular vein
32. Sternohyoid muscle
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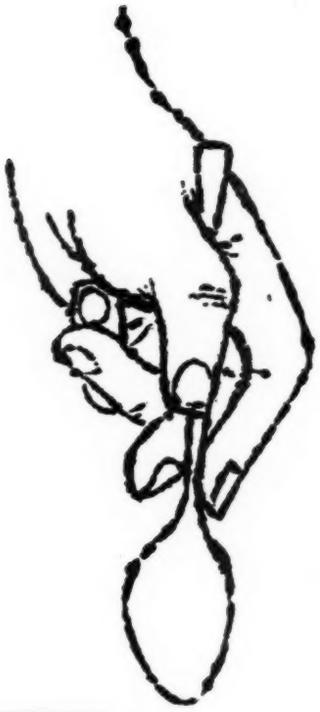

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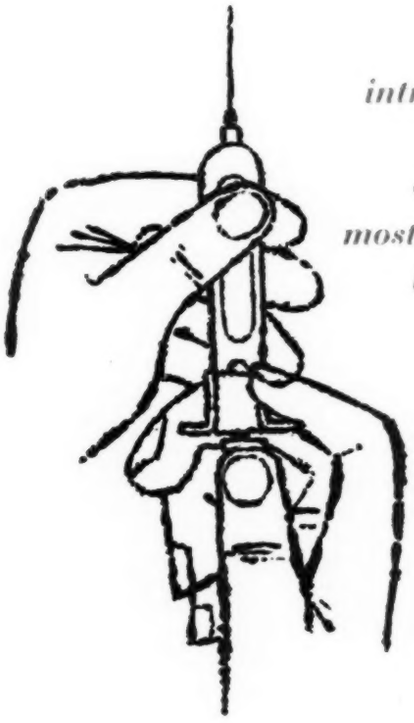

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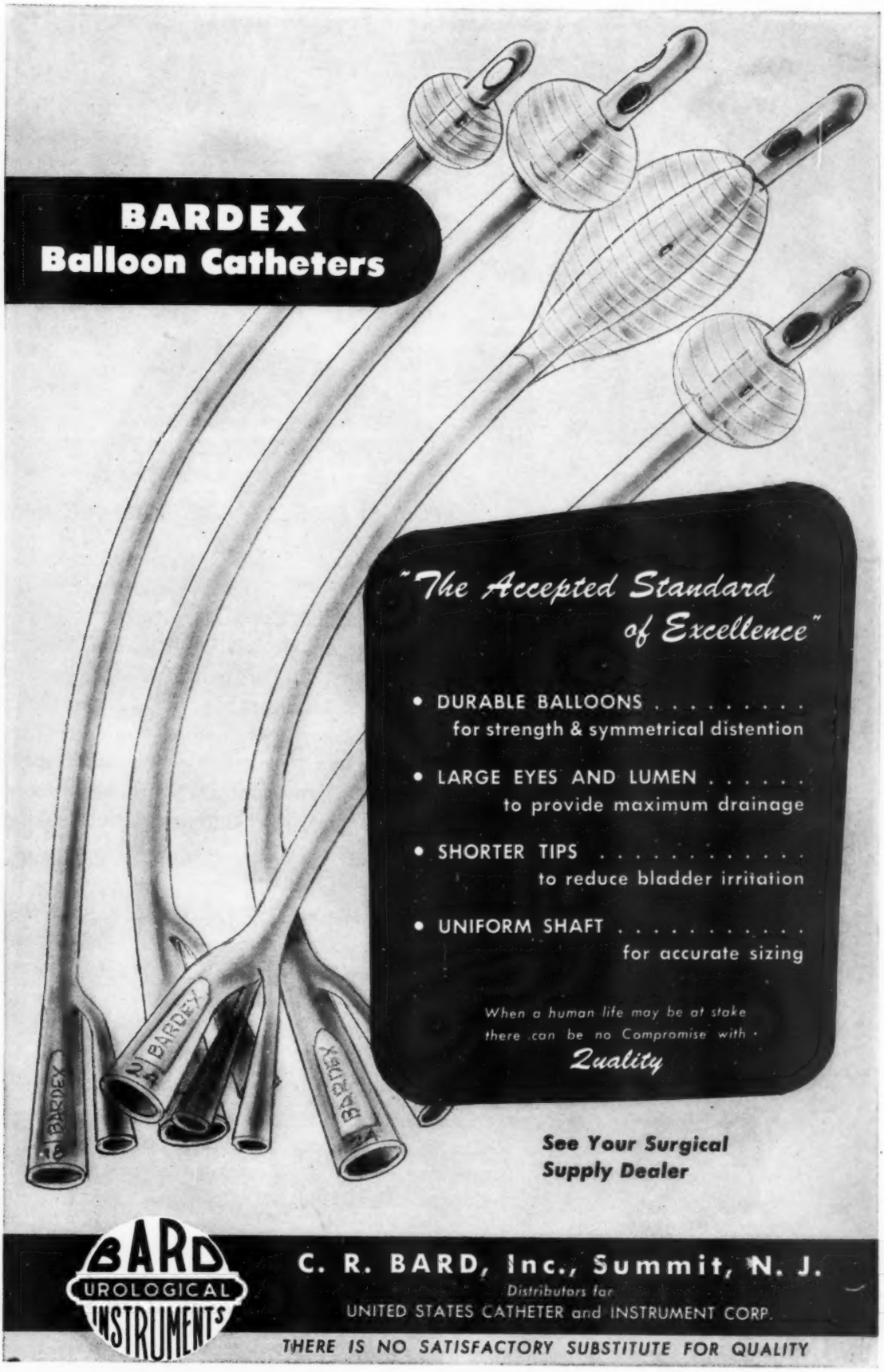
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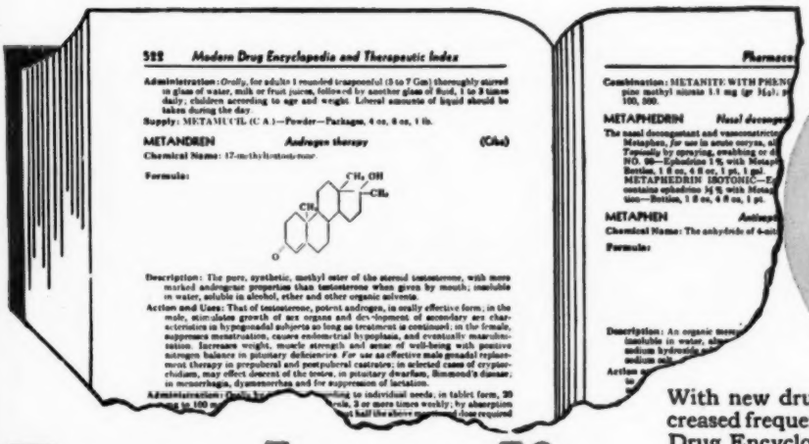
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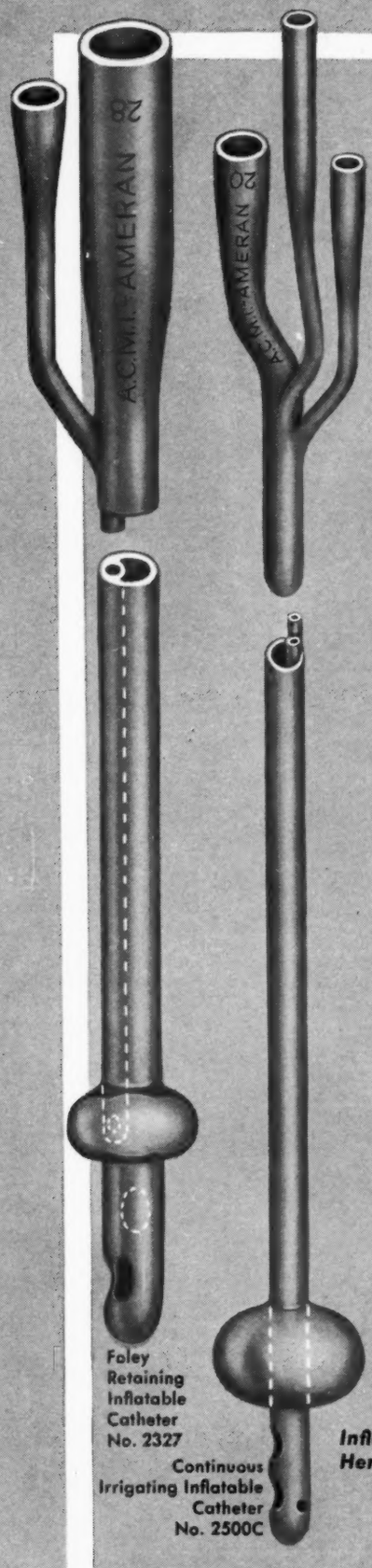

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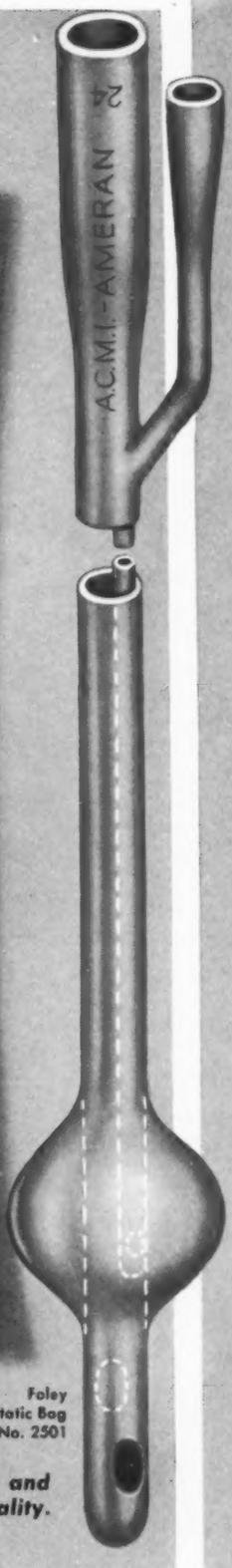

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Editorial

HOSPITALS AND INTERNSHIPS

APPEARING in the February 14th number of the *Journal of the American Medical Association* is the revised "Essentials of an Approved Internship." If you have already read this, you need not read from here on, because it is our purpose to give but a sketchy outline of the highlights of this report. The following is of special concern and interest to any and all physicians who have to do with the selection and training of interns.

We quote parts of the report as published in the *J. A. M. A.*:

"When the internship became a generally recognized part of the education of a physician some 40 years ago, it was designed to provide the graduate's initial contact with patients, including responsibility for their care. It no longer constitutes such initial contact nor is it any longer the final step in the formal education of most physicians. . . . A well-organized, effective, educational program inevitably results in the improvement of the quality of patient care in a hospital. . . . For such an educational program, it is fundamental that the staff recognize its obligation to permit full utilization for teaching purposes of all patients, whether private or nonprivate, to whom interns are assigned. Most authorities today are agreed that after graduation from medical school every physician should have at least two years of graduate education and training in a hospital before he undertakes the practice of medicine. . . . Graduate education in hospitals is offered in two categories—internships and residencies. . . . The American Boards in the specialities, however, give credit for only 12 months of internship education and require that the balance of a candidate's graduate education be in the form of a residency. . . .

"In order to provide the intern with a well-rounded experience during the course of his internship, an adequate number of patients in each of the several major clinical divisions is a primary requisite. The experience of the Council indicates that an acceptable rotating internship can be offered only in general hospitals having a capacity of at least 150 beds, exclusive of bassinets, and having a minimum of 5,000 annual admissions, excluding the newborn. Further, three of the four major clinical divisions must be represented in such a hospital. Modern trends in practice emphasize the importance of experience in an active outpatient department. Hospitals which do not have a well-organized outpatient department should provide this type of training through affiliation. . . .

"In general, a service to which a single intern is assigned should not consist of more than 15 to 25 beds. In determining the number of patients for which the intern is responsible, consideration must be given to work required of him in the outpatient department, the emergency room, the laboratory, and similar assignments. . . .

"In applying a ratio of 15 to 25 beds per intern, it is evident that, in order to carry

out a successful training program, a hospital of 150 beds requires an intern staff of from 6 to 10 interns.

"The staff, both visiting and intern, should be composed of physicians who are graduates of medical schools acceptable to the Council. Physicians appointed to the visiting staff must have proper qualifications as to medical education and licensure . . .

"Among other requirements, adequate records must be maintained, all case records must show by signature the names of the persons who have written them in whole or part, and orders for treatment, for most diagnostic studies, and all progress notes must indicate the identity of the person responsible for them. A competent medical record librarian should be in charge of the filing and indexing of records. Statistics concerning the professional work of the hospital should be compiled monthly and should be available to the medical staff at all times. An annual report should be prepared. . . .

"The pathologist should hold the degree of doctor of medicine from an acceptable medical school and have qualifications which are acceptable to the Council (the same holds true for the radiologist. There should be adequate space, equipment, personnel and records, etc) . . .

"It is essential that there be an adequate medical library readily accessible to the house staff. To facilitate its use, the library should be properly supervised. . . .

"There should be a committee of the staff chosen from the chairmen of the several departments or from among able and interested departmental representatives. This committee should assume responsibility for the organization, supervision, and evaluation of the plan of intern instruction.

"The appointment of a director of intern education on a full-time or part-time basis may be desirable in many hospitals. The director should be a person who has had experience and training that qualify him to plan and direct a sound program of instruction with the assistance and cooperation of other members of the intern committee and the staff. . . .

"The educational program consists of bedside teaching, clinical conferences, departmental conferences, clinical pathological conferences, x-ray conferences, record and fatality conferences, and journal club conferences. . . . The nature of the intern's duties are enumerated."

Regarding payment to interns, we read:

"*Interns' Stipends.*—Traditionally, the internship has been considered an extension of the physician's education during which he provides the hospital with certain services in return for his experience. The increased costs of a medical education and the additional financial obligations with which many graduates are burdened have made the payment of a reasonable stipend to interns which may be considered as a scholarship for graduate study, a widely accepted practice. However, when a hospital resorts to the payment of excessive salaries, bonuses or other forms of remuneration to attract an intern staff, there is reason to question the adequacy of its educational program.

"Hospitals that desire to qualify for approval for intern training should apply to the Council on Medical Education and Hospitals of the American Medical Association, 535 North Dearborn Street, Chicago 10. Appropriate forms for this purpose will be furnished on request. They should be completed with care by the hospital administrator or a member of the staff who is acquainted with the hospital's proposed program, with one copy to be returned to the Council's office. On receipt of the application, arrangements will be made for a member of the Council's staff to visit the hospital for the purpose of reviewing the training program and inspecting the hospital's facilities."

To established practitioners it is apparent that revolutionary changes in intern education and training have taken place during the last twenty years, but surely the majority will agree these new "rules and regulations" will place medicine on a much higher plane.

T. S. W.

Original Articles

PERINEPHRIC ABSCESS*

ROBERT S. HOTCHKISS, M.D.
New York, New York

THE accumulation of pus in the perinephrium often produces such a wide assortment of signs and symptoms that errors in diagnosis are all too common. Foulds aptly phrased the problem by stating, "There are few diseases which provide the urologist with more difficulty in diagnosis, and in which the precise methods of urological examination yield so little assistance as does perinephric abscess." The consequence of failure to recognize the lesion may very likely result in a fatality, so that it behooves the internist and the surgeon as well as the urologist to acquaint himself with the capricious nature of perinephric suppuration. The internist may be misled by assuming that pneumonia, pleurisy or empyema accounts for the illness. The surgeon may be baffled by the obscure symptoms and misdiagnose perinephric abscess as a subphrenic abscess, gallbladder disease, carcinoma of the colon, splenic abscess, caries of the spine or some other intraperitoneal disorder. The pitfalls in diagnosis account for the often late urologic consultation, and frequently the patient has become dangerously debilitated. To err in diagnosis and treatment at such a time imposes grave consequences, and the judgment of the urologist is severely tested. It is appropriate, therefore, to review some of the behaviorisms of this not uncommon infection, and, in particular, to stress and to appraise the diagnostic aids leading to the recognition of an abscess in the perirenal space.

ANATOMY

The anatomy of the perinephrium predetermines much of the course of the suppuration and lines of the extension. The suppurative process may arise in the kidney and thence extend into the perirenal fat, either by way of the adjoining blood and lymphatic systems or by direct rupture from the cortex of the kidney into the perinephric fat. (Fig. 1.)

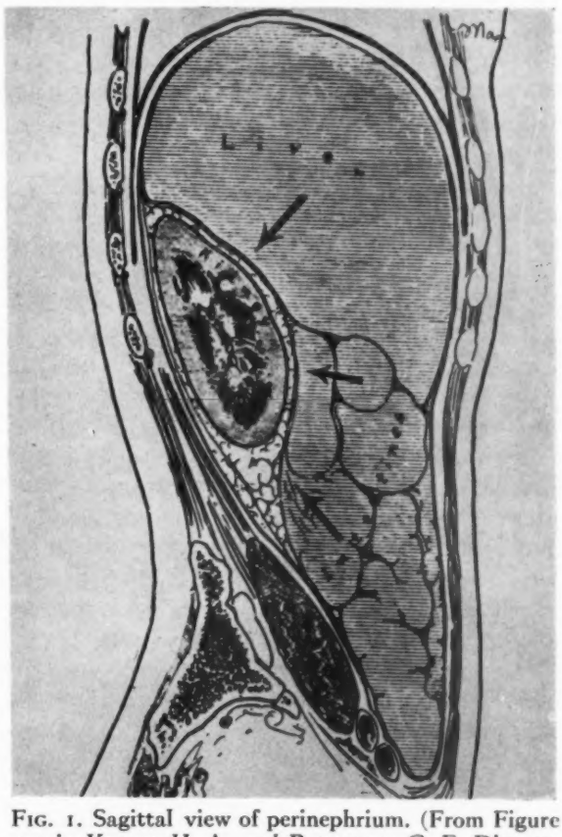

FIG. 1. Sagittal view of perinephrium. (From Figure 232 in KELLY, H. A. and BURNHAM, C. F. Diseases of the Kidneys, Ureters and Bladder, vol. 1. New York, 1914. D. Appleton and Co.)

This mode of direct extension has been classified as secondary perinephric abscess, and some observers believe that all perinephric abscesses develop from initial suppurative lesions in the renal parenchyma or pelvis. There is good evidence to believe, however, that a hematogenous

* From New York University Post-Graduate Medical School, Department of Urology, Fourth Division, Bellevue Hospital, New York, N. Y.

implant may occur in the perinephric fat from a distant suppurative process. This metastatic innoculation is termed "primary perinephric abscess" and a boil or carbuncle may be the site of the parent infection, a very useful clinical aid in diagnosis, especially in children. A third avenue of access to the space is by direct extension, such as a ruptured retrocecal appendix or a suppurative process in the thorax. The route must be first by the paranephric tissues and thence into the fat within the perinephric space. Two layers of Gerota's fascia predicate to some extent the dimensions of the abscess, for they fuse above at the diaphragm and separate as the two fascia layers insinuate into the abdominal wall. The intimate approximation of the kidney makes it apparent at once that infections confined to the renal parenchyma are often impossible to differentiate clinically from those in the perinephrium.

Pus may accumulate in the perirenal area where it may increase in size to assume enormous proportions. The infection may extend in one or all of five directions from the confines of the perinephric space. Most commonly it may penetrate beneath, or into the muscles of, the loin. It may extend downward between the diverting layers of Gerota's fascia to present itself as an abscess in the groin or in the paravesical area. Extension may be in a medial direction to perforate through the peritoneum and rupture into the abdominal cavity. The suppuration may also infiltrate upward to become a subphrenic abscess, or penetrate through the diaphragm and into the pleural and bronchial cavities. Most infrequent of all, the abcess may rupture into the colon. The vertebrae and the great vessels are bound firmly with the midline segments of Gerota's fascia. This furnishes an effective barrier and contains the suppuration to one side so that simultaneous bilateral perinephric abscesses seldom occur.

HISTORY

The history of complaints may be multiple, prominent or mild, and are notorious for their inconsistency. The onset may be rapid or unbelievably slow. Nevertheless, a detailed history may be the most important aid in diagnosis, for a clue to some pre-existing, and perhaps now healed, abscess may be brought to light by careful interrogation. Not infrequently the patient is too ill to respond to any questions, and the examiner must rest with objective findings. Pain is the most common complaint and is frequently the first symptom. A constant dull ache in the costovertebral angle is typical. The pain, however, may be localized exclusively to the abdomen or thigh, or be in combination with loin discomfort. It may be accentuated by hyperextension of the thigh because of the regional splinting of the lumbar muscles. The patient may object to contraction of the muscles on the affected side and thus, while standing erect, will bend easily toward the involved loin, but is unable to bend laterally toward the uninvolved side. On rare occasions the patient has no pain and even forceful percussion of the costovertebral angle causes no reaction.

Fever occurs in practically all patients having perinephric abscess. This may range from 90°F. to 100°F. or higher and is usually erratic and of the septic type.

The other signs and symptoms account for diagnostic difficulties for they often misdirect attention by their character and severity. Abdominal distention, vomiting, cough, hiccough, dyspnea, constipation or diarrhea may incriminate the appendix, colon, pleura or lungs. Profound malaise and weight loss, chills and sweat may be prominent features. There is usually a paucity of complaints referred to the urinary system, for frequency, dysuria and hematuria are not present unless the kidney is primarily involved with an inflammatory lesion capable of causing cystitis. The symptoms may be summarized as follows, but it must be emphasized that perinephric abscess can occur without any of the following complaints: (1) pain in the loin, which may radiate to the abdomen or thigh; (2) accentuation of the pain with hyperextension of the corresponding thigh; (3) aggravation or production of pain by lateral movement of the trunk toward the opposite side; (4) vomiting; (5) cough, hiccough and dyspnea; (6) constipation and diarrhea; (7) weight loss; (8) chills and fever; (9) frequency of urination, dysuria and hematuria.

PHYSICAL EXAMINATION

Physical examination may reveal a visible mass in the loin and abdomen and at times redness, edema and localized heat may be present. Diminished or absent breath sounds in the lung above the abscess are accounted for by fixation and elevation of the diaphragm or perforation into the chest cavity. This may cause digression of thought to a lesion entirely above the dia-

phragm. The abdomen may be rigid and distended, simulating an intra-abdominal lesion.

LABORATORY DATA

Urine: Analysis of the urine may be unremarkable, and for that reason it may divert attention from the urinary tract and be actually misleading. Usually some protein and a few blood cells are found in the urine. Numerous white and red cells are to be expected if there is a concomitant disorder in the kidney such as a stone, pyonephrosis or tuberculosis.

Blood: Leukocytosis is frequent and typically ranges between 15,000 to 20,000 white blood cells per cu. mm., with predominance of polymorphonuclear cells. Anemia is frequently found and often is severe. The leukocytosis may rise as high as 50,000 per cu. mm. in children.

X-ray: The most useful aid following the history, physical examination and routine laboratory tests is the roentgenogram. It must be borne in mind that there is only one x-ray finding that is pathognomonic of perinephric abscess. Almost a score of signs may be assembled from x-ray films that have been useful in indicating the possibility of perinephric abscess. These are not specific, but furnish only presumptive indications of the lesion and therefore are to be given appropriate consideration, balanced with the correlary signs and symptoms. It might be profitable to review the more familiar roentgenographic signs of perinephric abscess by citing exceptions to the rule.

Such an exercise is not intended to invalidate their worth in the diagnosis of perinephric abscess, but may illustrate their limitations and furnish a basis for differential diagnosis: (1) Homogenous density in the region of the kidney: Due also to enlargement of the kidney itself, such as hydronephrosis. (2) Displacement of the kidney, usually laterally and anteriorly, as depicted by lateral film: A retroperitoneal tumor may also displace the kidney. (3) Compression of calyces and/or pelvis: Neoplasm of the kidney may likewise cause distortion of the calyceal structures. (4) Displacement of colon and stomach: Retroperitoneal tumors or cysts may also produce a shift of the viscera. (5) Fixation of the kidney: A previous operation or infection may produce adhesions which prevent the kidney from shifting with change from prone to upright position. (6) Absent psoas shadow on the affected side: Parks reported that a review of 200 excretory pyelograms secured from patients without upper urinary tract disease demonstrated that both psoas shadows were absent in 9 per cent and an additional 11 per cent had only one psoas shadow visible. Thus one of five may fail to visualize one or both psoas muscles. (7) Curvature of the lumbar concavity toward the site of the lesion is absent in about 50 per cent of the cases of perinephric abscess, and may be due to poor posture, scoliosis or natural curvature. (8) Obscured ribs and transverse lumbar processes: Excessive weight and other peritoneal or intra-abdominal lesions may alter the density of the transverse processes as compared with the other side. (9) Loss of renal shadow is of no actual help in differentiation, for it is often difficult to distinguish the renal outline in many individuals. (10) Loss of renal function to concentrate the dye may be due to poor renal function and causes other than perinephric abscess. (11) Chest signs include elevation and fixation of the diaphragm, flattening of the posterior segment of the diaphragm, atelectasis of segments of the lung, pleural fluid and empyema. It is obvious that many of these signs may be due to intrinsic thoracic disease or subpleural lesions. (12) Osteomyelitis of the ribs and vertebrae may exist with perinephric abscess but are often present without pus in the perinephric area. (13) Failure of perirenal air to infiltrate about the kidney: Previous adhesions or unexplained impediments to the passage of air either injected into the presacral region or by way of the loin limits the usefulness of this test. There is grave danger of spreading the infection, for air or gas is known to invade the chest and extend even into the neck following perirenal insufflation. The test is mentioned to be condemned.

The only specific indication of perirenal abscess is an extravasation of contrast media into the perirenal region. This demonstration is best secured by retrograde pyelography; but if the kidney is capable of extracting intravenous contrast media, the sinus tract may be revealed by the intravenous method.

A clearer concept of the problems inherent with the diagnosis perinephric abscess may best be presented by a review of thirty case records of patients treated by the Department of Urology of Bellevue Hospital for perinephric abscess during the past twelve years. It may be important to note that primary calculi were associated with perinephric abscess in six instances; pyonephrosis in four patients and

FIG. 2. Case 1. Retrograde pyelogram demonstrating movement of left kidney during respiratory activity. The right kidney remains fixed and exhibits marked destruction of the calyces strongly suggestive of tuberculosis.

tuberculosis in two; diabetes was a concomitant disease in two others. Sixteen other patients were victims of perinephric abscess without significant correlated disease or definitive factors.

Several patients have been selected from this group, for their record would appear to be of value in demonstrating the erratic clinical course, diagnostic delays, and problems incident to the detection of a perinephric abscess.

CASE REPORTS

CASE 1. D. M. (No. 13714-47), a forty-seven year old married woman, was admitted to the hospital on March 15, 1947. She complained of a persistent dull ache localized to the right abdomen for three months. No urinary symptoms were reported.

Physical examination revealed a mass in the region of the liver. X-ray showed an area of increased density which was thought to be situated within the liver. A diagnosis of a tumor with secondary necrosis of the liver was made.

On March 24, 1947, a subcostal incision was made and a large amount of foul pus evacuated when the peritoneum was entered. Drains were inserted and the wound was closed about the drains. On April 11th a urologic consultation was requested. Prior to laparotomy the patient's temperature had been 105°F., white blood count 17,500 per cm.; non-protein nitrogen 26 mg. per cent. At the time the urologic examination was made, the patient was afrebile, comfortable, but draining a considerable amount of purulent material from the abdominal incision. The request for assistance from the urology department was prompted by the appearance of large numbers of white blood cells in the catheterized specimens of urine. These were reported to have appeared after laparotomy had been performed.

Cystoscopy was done and retrograde pyelograms were secured. The bladder had a capacity of 300 cc. There were numerous white flakes and cloudy material floating in the bladder and the mucosa was moderately injected. The specimen from the right kidney showed innumerable white cells and an occasional red blood cell. The specimen from the left side was unremarkable. No indigo-carmine appeared from the right side, whereas deep concentration was secured in ten minutes from the left after intravenous injection. Smears were made from each side for tubercle bacilli but these organisms were not found.

Retrograde pyelograms were taken during inspiration and expiration and a complete fixation of the right kidney was recorded whereas the left showed motility during the respiratory activity. (Fig. 2.) A diagnosis of tuberculosis of the right kidney with perinephric abscess was made.

On April 30, 1947, nephrectomy was performed. The peritoneum was adherent to the kidney and a sinus tract was found into the peritoneal cavity. A diagnosis was established of tuberculosis of the right kidney by tissue examination. Drainage from the abdominal wound stopped immediately and there was prompt closure of the loin incision.

On June 23rd the patient was transferred to the tuberculosis sanitarium with all wounds healed.

Comments: The absence of urinary symptoms despite renal tuberculosis is not a rarity. Great concern was given to the realization that the abdominal cavity had been thoroughly saturated with tubercle bacilli by the drainage of the perinephric abscess into that area. Pyelo-

grams demonstrated not only the right renal disease but also showed the fixation of the kidney during respiratory movements whereas the left pyelogram was blurred.

Follow-up has shown that the patient has remained well and has returned to her occupation.

CASE II. C. D. (No. 35684), age sixty-one, was admitted to the medical ward on July 27, 1948. The main complaint was dyspnea and pain in the left hip and thigh.

Physical examination revealed an emaciated Chinese man with tenderness in the left lumbar area. Bronchovesicular breath sounds were heard in the lower third of the left lung. Laboratory data were as follows: X-rays of the chest showed a large effusion filling the lower portion. Blood: white blood cells were 16,800 per cm.; hemoglobin, 11 gm. per cent; red blood cells, 4,680,000 per cm.; non-protein nitrogen, 37 mg. per cent; blood Wassermann, 4 plus. Urine: trace of albumin; white blood cells, 3 to 5.

A diagnosis of cardiac failure, hypertension and pleural effusion was made.

On August 18, 1948, paracentesis of the left chest was done and 300 cc. of purulent exudate were removed. Urologic consultation was requested on August 20th because of a high fever and particularly because an excretory pyelogram had been secured. This showed an obscuration of the left psoas shadow and no function and no concentration of dye in the left renal area. (Fig. 3.)

FIG. 3. Case II. "Ground glass" obscuration of details of left abdomen.

A gastrointestinal series had been obtained and these showed a mass in the left upper quadrant which had displaced the stomach and duodenum as well as the splenic flexure of the colon to the midline.

On August 27th cystoscopy was performed. The bladder appeared normal. A catheter was inserted into each ureter. From the left kidney 30 cc. of purulent material were aspirated. Retrograde pyelograms were inconclusive because of the residual of barium in the intestine obscuring the renal areas. A diagnosis of perinephric abscess with extension into the pleural cavity was made and on the following day an incision was made in the left loin, causing the release of 3,000 cc. of pus.

Digital exploration of the abscessed cavity disclosed an aperture of 1½ inches in diameter extending through the diaphragm into the pleura. Drains were inserted into the perirenal area as well as into the pleural cavity.

The patient's postoperative course was very precarious but he was discharged to his home on September 28th, the thirty-second postoperative day.

X-rays of the chest on September 9, 1948, showed that the empyema of the chest had been completely evacuated and only the thickened pleura (Fig. 4) remained. Retrograde pyelograms secured during convalescence demonstrated marked dilation of the calyces of the left kidney and fixation during respiration. The patient refused further cystoscopy, although he was urged to consent for further studies to evaluate the left kidney.

One year later he was seen in the follow-up clinic with the wound healed, asymptomatic. A voided specimen of urine contained only 2 to 3 white blood cells.

Comments: The presenting signs directed attention to the chest area and it is to be noted that three weeks elapsed between hospital admission and the request for urologic consultation. The disease in the left kidney remained undiagnosed. The suspicion of acid-fast infection was not substantiated by cultures or stained smears obtained from the left kidney prior to the drainage of the abscess, or in subsequent examinations.

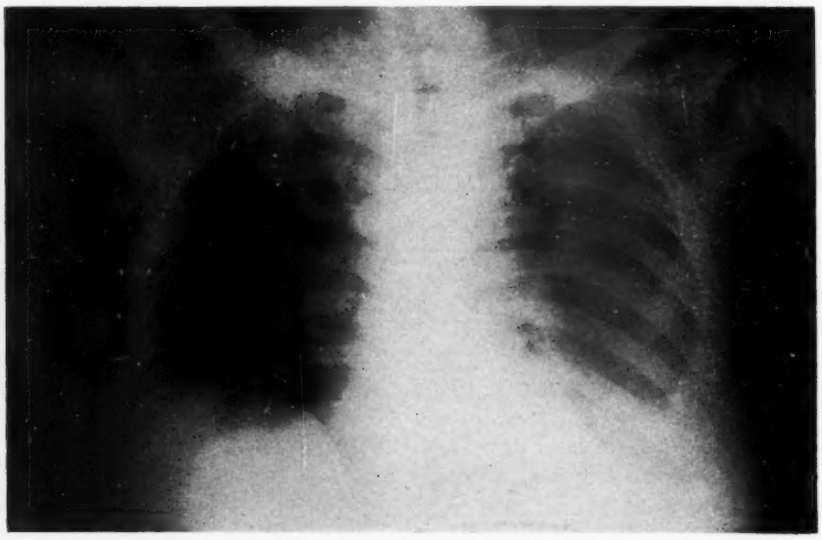

FIG. 4. Case II. Postoperative chest film illustrating the evacuation of pus which had filled the lower half of the left pleural cavity; thickened pleura remained.

CASE III. F. H. (No. 50808-46), age eighty-four, was admitted to the medical ward on October 26, 1946. The patient complained of intermittent pain in the left flank for three years. Two years previously a suprapubic prostatectomy was performed and the patient was told that a calculus was present in the left kidney. One year later incision and drainage of left perinephric abscess was done. Three weeks before admission the dull pain in the left loin became severe. Ulceration of the scalp had been present for six months.

Physical examination revealed a tender mass in the left abdomen together with some rigidity of the left loin muscles. Temperature was 98.6°F. to 100°F. Laboratory data were as follows: Blood: white blood cells, 10.950 per cm. Urine: albumin 4 plus; otherwise normal. An intravenous pyelogram showed no contrast media on left, normal on right. There was a large calculus in the left kidney. Cystoscopy and retrograde pyelograms were obtained on October 26th. Contrast media appeared to fill a sinus tract arising from the upper pole of the left kidney. (Figs. 5 and 6.)

On October 28th an incision was made at point of maximal bulging in left loin and 2,000 cc. of yellow pus escaped. The incision was enlarged and an attempt made to palpate the left kidney. Fibrous adhesions prevented recognition of either kidney or calculus. Because of the poor condition of the patient, drains were inserted and dressings applied.

A tumor of the scalp involving bones of the skull was excised on January 21, 1947 and the pathologist reported epidermoid cyst with squamous cell carcinoma. The patient was discharged on February 16, 1947. The left flank incision had never completely healed. Because of age, weakness and carcinoma of the scalp, nephrectomy was considered inadvisable.

Comments: Figures 5 and 6 show clearly the extravasation of dye from the pelvis of the kidney through the parenchyma into the abscessed area. This trustworthy sign of perinephric abscess was not vital in establishing the diagnosis in this instance, which was made on the history and physical findings alone.

CASE IV. S. S. (No. 19938-47), age seventy, was admitted to the hospital on April 20, 1947. The patient was too ill to answer questions. In December, 1945, a suprapubic prostatectomy had been performed. At that time a diagnosis of diabetes was established and the usual preliminary pyelograms demonstrated an irregularity in the left kidney which was presumed to be a cyst. Because of his age and diabetic condition an exploration of the kidney was not done.

Physical examination revealed a very slight costovertebral angle tenderness. Temperature was 105°F. Laboratory data showed the following: Urine: reducible substance 4 plus, acetone 1 plus. Blood: red blood cells, 5,280,000 per cm.; white blood cells, 10,800 per cm.; blood sugar, 250 mg. per cent; non-protein nitrogen, 30 mg.

FIG. 5. Case III. Plain film of left abdomen. Large calculus in left renal area with increased density in adjoining areas.

FIG. 6. Case III. Left retrograde pyelogram demonstrating cephalad serpentine extravasation of contrast media into perirenal spaces.

per cent; carbon dioxide combining power, 35 vol. per cent. An intravenous pyelogram showed no abnormality except a soft shadow over the lower pole of the left kidney which was unchanged from films secured two years previously. X-ray of the chest revealed a collection of fluid at the left base with slight elevation of the left diaphragm. (Fig. 7.)

The patient continued to have a septic temperature, rapid weight loss and great difficulty was encountered in controlling the diabetes.

Repeated examinations failed to disclose more than a slight, doubtful tenderness in the left loin. Retrograde pyelograms did not show any displacement of the kidney or evidence of a ground glass opacity in the left kidney area. (Fig. 8.)

On May 2, 1947, it was decided to explore the left kidney for perinephric abscess. A large orange-sized cyst was found at the lower pole of the kidney. No purulent material was encountered until the extreme upper pole of the kidney was reached. At this point there was a rupture of about 15 cc. of greenish pus. The cyst was punctured and the contents were clear and not infected. The walls of the cyst were resected and drains were inserted into the region of the upper pole.

The patient was discharged on June 14, 1947, and had a slow, difficult recovery. Persistent drainage from the incision continued for three months, but six months after the operation there was no further drainage and the patient has enjoyed a complete recovery.

Comments: This case is presented to illustrate the inadvisability of depending upon aspiration of the perirenal space for pus to establish a diagnosis. This was not done but should it have been attempted it is inconceivable that the needle would have entered the pus cavity because of its small size and suprarenal location. A negative result from aspirations might have further delayed the operation. Furthermore this patient illustrates the difficulties of establishing a diagnosis. The excretory and retrograde pyelograms were not characteristic of perinephric abscess. The pain was minimal even with percussion of the loin. The only objective findings were pleuritis, fever, leukocytosis and diabetes.

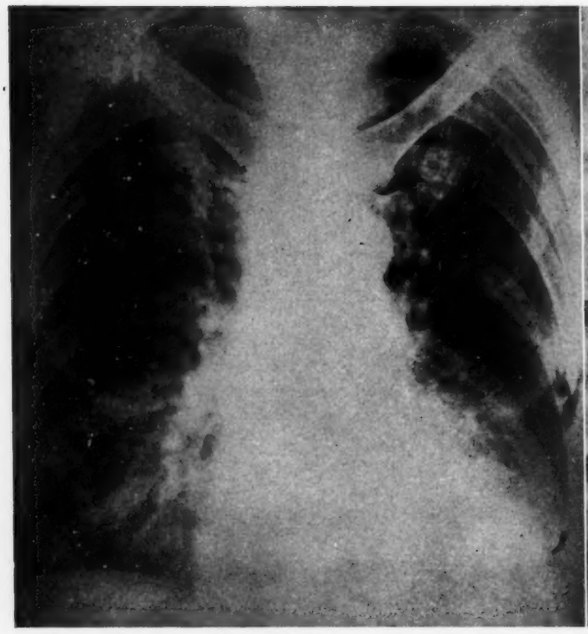

FIG. 7. Case IV. Chest film illustrating left pleuritis and slight elevation of diaphragm.

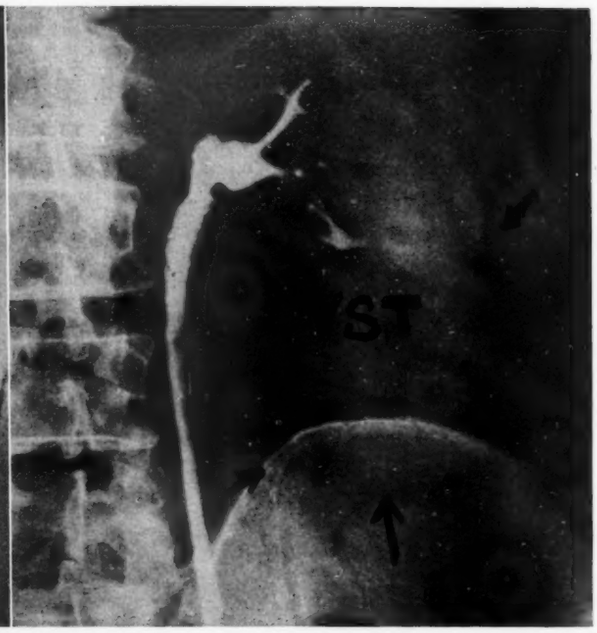

FIG. 8. Case IV. Retrograde pyelogram left psoas obscured; space occupying lesion in lower pole with compression of calyces.

CASE V. I. E. (No. 20656-47), age forty-six, was admitted to the hospital on February 24, 1947. For five years the patient had had several attacks of right loin pain. Two days prior to admission he had severe pain in the right loin, radiating to the right groin. For many years, at another hospital, he had received periodic dilations for ureteral stricture. He was admitted to Bellevue Hospital in a semi-stuporous state.

Physical examination revealed a distended tympanitic abdomen, with marked rigidity of the right abdominal muscles. There was tenderness in the right costovertebral angle and a mass was palpated occupying the right abdomen. Temperature was 105°F. Laboratory data were as follows: Urine: albumin 3 plus; 6 to 8 red blood cells. Blood: white blood cells 20,800 per cm.; red blood cells, 5,070,000 per cm.; nonprotein nitrogen, 36 mg. per cent.

An excretory pyelogram showed dilatation of the calyces on the right side; whereas an essentially normal kidney was seen on the left. A small ovoid shadow was seen in the line of the right ureter near the ureterovesical junction. The details of the pyelogram were obscured because of the large mass occupying the right loin.

Cystoscopy was performed. The bladder itself did not appear to be remarkable. A catheter could not be passed more than 0.5 cm. beyond the right ureteral orifice. (Fig. 9.) A diagnosis was made of right ureteral obstruction (presumably a small calculus), with probable right perinephric abscess.

On February 27th a right loin incision was made. Gerota's fascia was edematous, and over the superior pole of the kidney an abscess was found containing 30 cc. of material which was entirely external to the parenchyma. Nephrostomy was performed and a large amount of purulent urine was removed. A drain was placed in the pus pocket at the region of the superior pole. Culture yielded Bacillus coli. Recovery was slow but the wound healed satisfactorily about the nephrostomy tube. A pyelogram secured through the nephrostomy tube did not reveal an obstruction in the lower ureter.

On May 18, 1947, a second cystoscopy was performed and the ureter was easily catheterized and no calculus was encountered.

A bifid pelvis was demonstrated by retrograde pyelogram with union of two ureters before reaching the lower third of the ureter. (Fig. 10.) The patient was discharged on May 20th. His follow-up examinations have shown no further difficulty.

Comments: The mass felt in the loin was not entirely due to an accumulation of perinephric pus but was also composed of a distended kid-

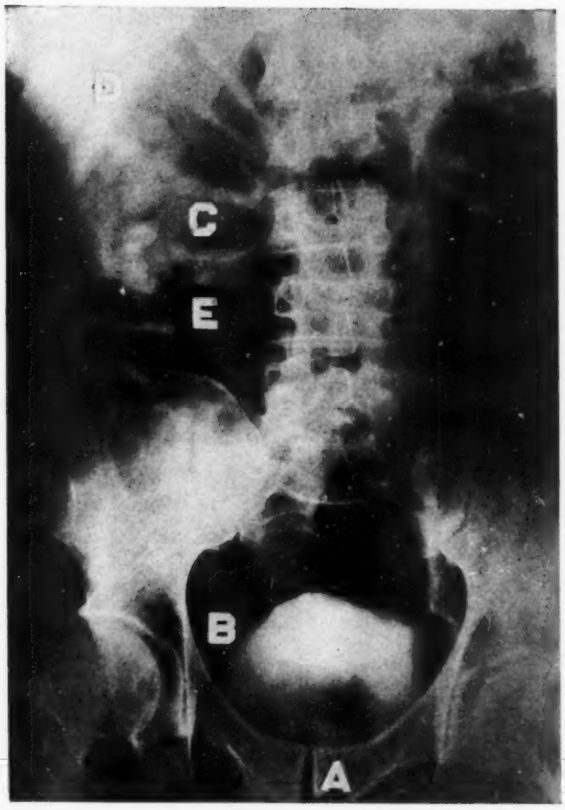

FIG. 9. A, multiple urethral strictures; B, calculus; C, hydronephrosis; D, early perinephric abscess; E, reduplicated kidney and ureter.

FIG. 10. Case v. Postoperative retrograde pyelogram demonstrating bifid pelvis and reduplication of ureters.

ney, resulting from an impacted calculus at the lower portion of the ureter.

This illustrates the result of a complete ureteral obstruction producing an infected hydronephrosis with perirenal suppuration. Recovery was dependent on the release of the perirenal abscess and relief of the obstruction by nephrotomy. The calculus passed spontaneously following operation.

CASE VI. M. D., age forty-five, was admitted to Bellevue Hospital on May 25, 1942. The previous hospital admissions and operations were as follows: June, 1939, right pyelotomy for removal of stone; August, 1939, incision and drainage of right perinephric abscess; and April, 1942, left pyelotomy for staghorn calculus.

On May 25, 1942, patient was readmitted with pain, chills and fever. A pyelotomy was performed on the right kidney. In July, 1942, an incision and drainage of a left perinephric abscess was required. At this time the nonprotein nitrogen was 150 mg. per cent. There was progressive deterioration resulting in death on August 28, 1942. Autopsy revealed pyonephrosis of the right and left kidney.

It is not necessary to abstract this case record in more detail to illustrate the possibility of extension of renal infections into the perinephric space.

CASE VII. P. S. (No. 21106-47), age fifty-nine, was admitted to the hospital on April 28, 1947. The patient complained of pain of three weeks' duration in the left upper quadrant radiating to the suprapubic region and the left shoulder, and nausea, vomiting, constipation nocturia and diurnal frequency.

Physical examination revealed a firm, tender, irregular mass which was palpated in the left upper quadrant and moved on respiration. There was also some slight tenderness in the upper right quadrant but no masses were felt. Temperature was 104°F. Laboratory data were as follows: Blood: non-protein nitrogen, 30 mg. per cent; white blood cells, 5,850 per cm.; red blood cells, 2,530,000 per cm.; hemoglobin, 7.8 gm. per cent. Urine: albumin, 4 plus; granular casts; moderate number of white blood cells

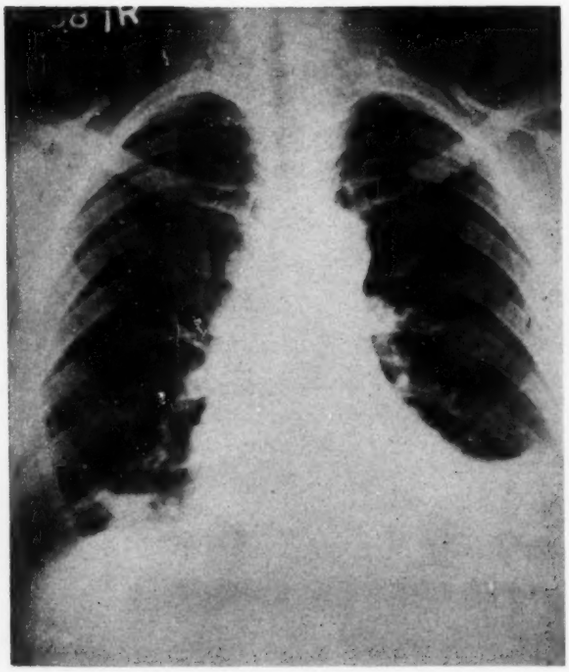

FIG. 11. Case VII. Reactive pleuritis in left lower chest.

FIG. 12. Case VII. Inspiration-expiration retrograde pyelogram; limited motility left pelvis as compared to right; downward displacement and compression of left pelvis; psoas shadow is well outlined.

with occasional clumps; gram-negative bacteria; rare red blood cells. Urine culture revealed Escherichia coli. X-ray of the chest showed no definite evidence of a consolidation of the lung. The left diaphragm was obscured by a convex density which was thought to represent a reactive pleuritis. (Fig. 11.)

Cystoscopy was performed and a retrograde pyelogram demonstrated a normal right kidney. The left kidney was characterized by a deformity of the pelvis which appeared to be due to a mass, possibly spleen, pressing against it. The calyces were sharply outlined. Expiration and inspiration films showed mobility of the right kidney, but limited mobility of the left kidney. The psoas shadow was outlined on each side. The left lateral films showed the renal pelvis to be normally situated in relation to the vertebral column. (Fig. 12.)

Diagnosis of possible perinephric or subdiaphragmatic abscess was made and on May 20, 1947, a left loin incision was made. The kidney was exposed but no pus was encountered. The peritoneum was then opened and the spleen was found to be enlarged and fixed to the superior pole of the kidney. The entire mass was adherent to the posterior peritoneum. A large amount of pus was freed when an attempt was made to release the attachments. The cavity was explored and found to be in the subdiaphragmatic space. Drains were inserted.

Despite antibiotics and blood transfusions the patient became irrational, toxic and continued to have profuse drainage from the wound. Edema of the lower extremities developed and the patient died on May 30th, the ninth postoperative day, with a temperature of 103°F. Non-protein nitrogen was then 56 mg. per cent.

Autopsy showed suppurative phlebitis of the splenic vein, lobar pneumonia and arteriosclerosis.

Comments: The indications for surgical intervention were sufficient to proceed with incision and drainage. When pus is not found in the renal area, it is correct to explore the organs adjacent to the kidneys until one is satisfied that no pus exists in the subdiaphragmatic or splenic areas.

CASE VIII. A. A. (No. 64303), age sixty, was admitted to the hospital on August 10, 1949. The patient had been admitted to another hospital in December, 1947, and a diagnosis of kidney stone had been made. No treatment was given at that time. In December, 1948, an operation was performed elsewhere and the ab-

scess outside of the right kidney drained. The sinus persisted and the patient was readmitted to various hospitals for incision and drainage of pus when the sinus would close. Four such operations had been performed. Two weeks prior to admission pain, fever, malaise, cough and chest pain prompted admission for the first time to Bellevue Hospital.

Physical examination revealed localized tenderness and swelling over the surgical scars in the right flank. Temperature was 105°F. Laboratory data were as follows: Urine: essentially negative except for 15 to 20 white blood cells; culture Bacillus aerogenes; negative for tubercle bacilli.

Cystoscopy on August 20th demonstrated a normal bladder. Catheters were passed to each kidney. No urine was obtained from the right kidney and clear urine from left. Bilateral ureteropyelograms were secured. The plain films revealed obscuration of right psoas muscle. A small calcification (1 by 1 cm.) was observed overlying the right twelfth rib. Retrograde films demonstrated a normal left ureteropyelogram. The calculus was located in the upper calyx of the right kidney as demonstrated by contrast media. A sinus tract was shown by the efflux of the urographic media from the upper minor calyce into the right perinephric space. A tortuous right ureter was outlined with multiple filling defects characteristic of ureteritis cystica. (Fig. 13.)

FIG. 13. Case VIII. Bilateral retrograde pyelograms; sinus tract outlined from upper right calyx into perinephric space.

Impression was right perinephric abscess, calculus in right kidney and ureteritis cystica. Operation was performed on August 21st. A previous scar was excised and the incision carried through the subcutaneous tissues releasing 200 cc. of purulent material. Sinus was probed through a dense scar. Neither the kidney nor the calculus was felt with certainty. Temperature declined rapidly to normal. Postoperatively pain subsided and the patient had marked general improvement within seven days. The flank healed and the patient was discharged on October 6th, the forty-sixth postoperative day.

On April 28, 1950, the patient was readmitted, with pain in the right flank for eight days. On May 16, 1950, nephrectomy was performed. The pathologic report revealed tuberculosis of the kidney, with calculus in the upper pole. The patient was discharged on July 5, 1950.

Comment: The sinus tract leading to the perinephric space is nicely demonstrated in the accompanying film permitting the diagnosis of perinephric abscess. Tuberculosis was not suspected nor revealed by culture. The calculus in the upper calyx together with renal tuberculosis probably caused the performation and formation of perinephric abscess.

CASE IX. J. R. (No. 48725-46), age fifty-five, was admitted to the hospital on October 13, 1946, complaining of nausea, vomiting and pain in the left flank of one week's duration. The patient was drowsy, semi-stuporous, with incontinence of urine.

Physical examination revealed a temperature of 101°F., a large mass in the left upper quadrant and marked spasm of the left lumbar muscles. Laboratory data were as follows: Blood: white blood cells. 18,500 per cm.; non-protein nitrogen, 50 mg. per cent. Urine: reddish color; albumin, 2 plus; microscopically innumerable red blood cells and white blood cells. Intravenous pyelogram: fair excretion by both kidneys; right pelvis and ureter outlined; pelvis and calyces dilated on left with loss of renal outline and left psoas shadow.

On October 15, 1946, an incision was made in the left loin. After entering Gerota's fascia

FIG. 14. Case IX. Retrograde pyelogram left kidney following incision and drainage of abscesses; the efflux of contrast media into perirenal space is well demonstrated.

800 cc. of purulent material was released. The cavity was digitally explored and loculations broken; drains were inserted.

Postoperative course showed improvement following incision and drainage, but seven days later the patient became stuporous although non-protein nitrogen fell to 36 mg. per cent. A mass was palpated in the suprapubic area.

A second operation was performed on October 26, 1946. A midline suprapubic incision was made and an extraperitoneal mass identified to the left of the bladder; 2,000 cc. of offensive seropurulent fluid was evacuated. Cavity was explored and found to be continuous with the cavity in the perinephric space. Drains were inserted into the suprapubic incision and out through the wound in the flank.

The postoperative retrograde pyelogram demonstrated the abscess cavity adjacent to the kidney. (Fig. 14.) There was a gradual fall in temperature and general improvement with progressive gain in weight. The wounds healed slowly. Non-protein nitrogen was 30 mg. per cent.

On November 23rd the patient died suddenly while walking in the hospital corridor. Prior to death a retrograde pyelogram depicted the contrast media outside the renal area.

No cause for sudden death was found at autopsy, but it was thought to be due to coronary insufficiency. Chronic retroperitoneal inflammation was present with multiple small cortical abscesses in the left kidney. There was localized necrosis in the left renal parenchyma with perforation in one area, into the perinephric space.

Comment: A relapse after improvement following incision and drainage of a perinephric abscess suggests extension of a secondary collection of pus in adjacent areas. In this instance the second abscess developed in the pelvis.

CASE X. S. L. (No. 37670-44), age fifty, was admitted to the hospital on August 18, 1944, with progressive enlargement of the left flank which had begun ten weeks previously. She had been admitted to another hospital where the left loin was punctured by an aspirating needle and 150 cc. of pus removed which was sterile to culture. No acid-fast bacteria were found. The patient was then transferred to Bellevue Hospital.

Physical examination revealed a large fluctuant mass (the size of a football) with two small sinuses exuding purulent material. Temperature was 101°F. Laboratory data were as follows: Blood: white blood cells 18,500. Urine: albumin present; 50 white blood cells; otherwise negative. Chest x-rays showed slight elevation of the left diaphragm. Plain film of the abdomen demonstrated a large calculus overlying the left transverse process of the third lumbar vertebrae. Small calcifications were scattered in the left renal area, "ground glass" appearance to left abdomen. (Fig. 15.)

On August 22, 1944, an incision was made through the skin and 1,000 cc. of pus exuded. Sinus tract was digitally explored extending toward the upper pole. Neither stone nor kidney palpated. Drains were inserted.

There was rapid improvement postoperatively, the temperature being normal on the eighth postoperative day.

A retrograde pyelogram done on October 7, 1944, showed a normal right pyelogram; left catheter was obstructed by calculus in left ureter. No dye passed calculus, when injected through ureteral catheter. The wound healed

FIG. 15. Case X. Plain film of left abdomen shows "ground glass" obscuration of left abdomen; large calculus overlying left transverse process of third lumbar vertebrae with smaller densities in left renal area.

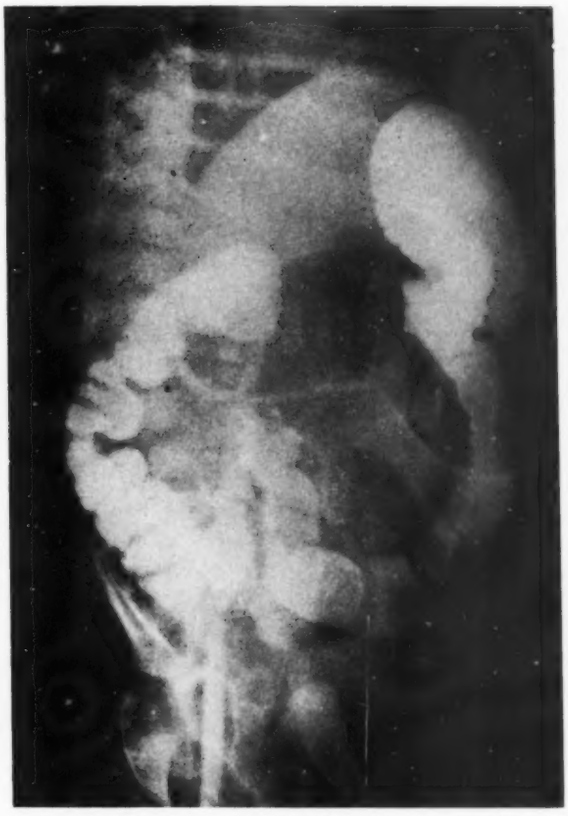

FIG. 16. Displacement of colon by retroperitoneal mass in region of left kidney in male infant age two months (oblique view).

and the patient was asymptomatic. She refused nephrectomy and left the hospital against advice.

Comments: The "ground glass" area and calculus near the third lumbar vertebrae is well illustrated. The refusal of the patient to permit correction of cause of suppurative process makes recurrence a likely possibility.

CASE XI. M. B., age two months, was admitted to the University Hospital, Department of Pediatrics on August 11, 1951. The chief complaint was a mass in the left abdomen. Past history revealed a forceps delivery following which a cephalohematoma developed. Circumcision six days after birth was followed by severe bleeding requiring four transfusions. On the day prior to admission the baby began to vomit, was irritable and was in apparent pain. The left thigh was flexed against the abdomen. Examination disclosed a mass filling the left loin. Marked pallor was present and the temperature was 103°F.

Laboratory data were as follows: Urine: essentially negative. Blood: hemoglobin 8.5 gm. per 100 cc.; red blood cells 2,560,000 per cm.; white blood cells 16,850 per cm., neutrophils 53, eosinophils 7, lymphocytes 34, monocytes 5, myelocytes 1, platelets 260,000; bleeding time seven and an half minutes; coagulation time five minutes; clot retraction complete in three and a half hours. Barium enema was normal except for median dislocation of the descending colon. (Fig. 16.) Excretory pyelogram showed the left kidney displaced upward and anteriorly; left pelvis located at first lumbar vertebrae in contrast to right which is opposite the third; left ureter deviated to right midline position.

Despite repeated blood transfusions the baby remained pale and the hemoglobin ranged between 6 and 8 gm. per 100 cc. Venipunctures resulted in large hematomas. Hematologic examinations showed prothrombin consumption of thirteen seconds and the opinion was that the infant had hemophilia which contraindicated surgery. The child's temperature was of a septic type and the possibility of infected spontaneous hematoma

of perinephric or paranephric space was entertained.

On September 12, 1951, No. 13 needle was inserted into the left flank and sanguinopurulent material was aspirated which on culture yielded hemolytic Staphylococcus aureus. A polyethylene catheter was threaded through the needle and left indwelling for drainage. At about this time blood appeared in the feces, and the temperature subsided. Within six days the mass had disappeared. Indigo carmine injected into the catheter appeared in the feces.

The patient was discharged on October 10th, afrebile and without a mass. Pyelograms disclosed normal configuration and position.

Comments: The final diagnosis was infected, spontaneous hematoma occurring in an infant with hemophilia. Its location in the retroperitoneal space was not clearly established for surgery was prohibited. The bulk of the abscess drained into the colon. The diagnosis was aided by aspiration but the drainage was inadequate by this method.

TREATMENT

The availability of antibiotics and the sulfonamides does not alter the requirements for incision and drainage of the abscess as soon as the diagnosis is established. Reports have appeared in the literature of the cure of perinephric abscess by administration of the antibiotics, and it is possible that this may have occurred. Unless the abscess is opened and drained, the diagnosis is never confirmed so that the proof of the efficacy of such therapy alone has not been clearly established. It is appropriate to record that the antibiotics have deterred rather than hastened the recognition of perirenal suppuration, for the course of the disease is probably modified by these agents, thereby masking the signs and symptoms and postponing the diagnosis. The incidence of metastatic perinephric abscess has doubtless been greatly reduced by the general utilization of antibiotics in the treatment of the primary infections.

The condition of the patient may limit the operative procedure to a minimum but it is never too late to operate for a perinephric abscess. In our experience incision and drainage has been performed on comatose patients so ill that anesthesia was not required. It is seldom that a surgeon has equal opportunity to salvage patients in extremis such as is afforded by the drainage of a large perinephric abscess. Usually prudence will dictate that evacuation of the pus is the only safe procedure even though positive knowledge of a calculus blocking the kidney has been secured before the operation. The surrounding tissue is commonly firm, tense and edematous, and visual exposure is usually denied the operator. Often it is difficult to ascertain if the cavity extends into the kidney itself, but the region is always explored by introduction of the finger into the wound to favor drainage. In the author's experience it seldom becomes necessary to reopen the incision to release a walled-off cavity, for apparently perinephric abscess cavities communicate with one and another if multiple. As illustrated by one of the preceding cases the indications may arise that a second cavity has developed, or has not been drained, and on rare occasions a second incision becomes necessary. Drains are always inserted and the wound is left opened or approximated in a loose manner, so that there will be no obstruction to the evacuation of the pus which usually continues for several days. The abscess may be large and pus may be encountered directly under the subcutaneous tissue. If the suppuration is confined by Gerota's fascia, obvious edema is usually encountered in the muscles of the loin covering the fascia. At times it may become necessary to free the kidney until a localized abscess is encountered as illustrated by the case record of a small abscess at the superior pole of the kidney. Considerable individualization as to the choice and extent of the procedure is required and nephrotomy or nephrectomy may be done if indicated and circumstances permit. The deciding factors are often the status of the patient, the amount of pus and, in particular, the amount of reaction in the perinephric tissue, for the edema and induration often prohibits manipulation of the kidney. In general it is better to postpone nephrectomy or removal of a calculus to a time when the patient has recovered from the sepsis incident to the perinephric abscess.

Only under exceptional circumstances should aspiration by needling be done for either diagnosis or treatment. If the abscess is deeply situated, posterior or superior to the kidney, it is unlikely that the needle will enter the pocket. The surgeon might be tempted to postpone operation if the diagnostic aspiration does not secure pus. If there is enough evidence to believe that a perinephric abscess is present, it is "better to aspirate with the scalpel."

COMMENTS

It is quite possible that the first operations ever attempted on the kidney were performed for perinephric abscess or huge pyonephrosis. History records that in 1474 the prisoner, Franco-Archer of Meudon, was granted freedom by Louis XI for permitting Germain Colot to evacuate an abscess about the kidney. The facts are blurred by the mists of antiquity but it is reported that the "Archer went through the operation admirably." For 300 years thereafter, apparently, surgeons did not realize what they were doing when they incised the lumbar muscle, supposedly for operations upon the kidney. Hevin, in 1757, showed that the surgeons up to that time were operating on perinephric abscesses under the impression that the renal calculi took origin in a pus pocket outside or behind the kidney. It was he who described the necessity of entering the substance of the kidney to remove stones which formed in the pelvis.

Perinephric abscess is more common in adults but the infection may develop in the very young. Townsend described an infant of five months and De Sanctis one of six months having perinephric abscess. The content of the perinephric space in children is small compared to the adult and the preponderance of the infections in children arises from an extrarenal source by hematogenous metastasis. Swan stresses the fact that many pus cells and bacteria in the urine indicates that a perinephric abscess in children co-exists with a primary disorder in the kidney whereas their absence indicates a metastic type of abscess. This was of prognostic significance in his report for mortality from metastatic perinephric abscess was zero, whereas when it was complicated by renal disease, the mortality was 45 per cent. The same delays and difficulties in diagnosis occur in children as in adults.

The complications involving the chest incident to perinephric abscess have not been well appreciated. Nesbit reviewed all reports in the literature since 1900 and found only nine cases in which perinephrobronchial fistula were found associated. In a review of sixty cases cared for at the University Hospital in Ann Arbor, 10 per cent had proven perinephrobronchial fistula. The adhesive pleuritis prepares the way for the fistula and thus it is imperative to obtain x-rays of the chest in all cases of suspected perinephric abscess.

There is no simple formula for the recognition of an abscess in the perirenal space. Probably the foremost reason for delay and error in diagnosis is that the perinephric abscess is not brought to mind at all during the analysis of the signs and symptoms presented by the patient. Useful clues are to be found in the history, physical, laboratory data and in x-ray films. Proper appraisal of these and alertness to this entity will most certainly save lives.

REFERENCES

Atcheson, D. W. Perinephric abscess with review of one-hundred and seventeen cases. *J. Urol.*, 46: 201–215, 1941.

Beer, E. Roentgenographic evidence of perinephric abscess. *J. A. M. A.*, 90: 1375–1376, 1928.

Bugbee, H. G. Perinephritis and perinephric abscess. *Am. J. Surg.*, 26: 255–266, 1934.

Burhans, R. A. Perirenal air insufflation; an aid to urological diagnosis. *J. Urol.*, 44: 618–634, 1940.

De Sanctis, A. G. and Reisman, H. A. Perinephric abscess in children. *J. New York State Med.*, 28: 584–587, 1928.

Foulds, G. S. Diagnosis of perinephric abscess. *J. Urol.*, 42: 1–9, 1939.

Greenwald, H. M. and Kresky, P. H. Perinephric abscess in children. *Urol. & Cutan. Rev.*, 45: 289–294, 1941.

Groves, R. C. and Solomon, S. J. Perinephric abscess in infants. *New England M. J.*, 207: 819–820, 1932.

Kelly, H. A. and Burnam, C. F. Diseases of the kidney, ureters and bladder, vol. 1, fig. 232. New York, 1914. D. Appleton & Co.

Mathe, C. P. A new sign for diagnosis of perinephric abscess. *Urol. & Cutan. Rev.*, 38: 639–642. 1934.

Neilsen, A. M., Dick, G. F. and Maddock, W. G. Chronic perinephric abscess with perinephrobronchial fistula. *J. Urol.*, 63: 433–437, 1950.

Nesbit, R. M. and Keene, C. H. Perinephric abscess and perinephro-bronchial fistula. *J. Urol.*, 37: 695–705, 1937.

Ockuly, E. A., Barnhardt, W. T. and Egbert, H. L. Treatment of perirenal abscess with penicillin. *J. A. M. A.*, 129: 274–277, 1945.

Rolnick, H. C. and Burstein, H. J. Perinephric abscess. *J. Urol.*, 25: 507–512, 1931.

Rusche, C. F. and Bacon, S. K. Unusual conditions simulating perinephric abscess. *J. Urol.*, 34: 504–515, 1935.

Shane, N. J. and Harris, M. Roentgenologic diagnosis of perinephric abscess. *J. Urol.*, 32: 19–26, 1932.

Stites, J. R. and Bowen, J. A. Diagnostic difficulties in perinephric abscess. *Soutb. M. J.*, 30: 1062–1064, 1937.

Swan, H. Perinephric abscess in infants and children. *Am. J. Surg.*, 61: 3–10, 1943.

Townsend, W. R. Perinephric abscess in children. *J. A. M. A.*, 43: 1626–1629, 1904.

KÜNTSCHER NAILING OF THE FOREARM IN PROBLEM CASES*

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NO large series of forearm fractures treated with Küntscher nails has appeared in the American literature that we have reviewed.[11,26,47–52,57,58] This series of nineteen fractures in twelve patients that we wish to report is not large but is presented for the following reasons: (1) In each fracture some type of internal fixation of the fragments seemed indicated. (2) In all fractures except three some type of reduction and fixation had been futilely attempted prior to consideration of the Küntscher nail. (3) The use of the Küntscher nail offered adequate fixation and contact coaptation. (4) The group presented a variety of conditions including non-unions, malunions, fresh, comminuted, closed and open fractures. (5) The results seem to justify use of this technic.

All of the patients in this series were men except one, a fifty-four year old woman with bilateral forearm fractures. The patients ranged in age from twenty-one to fifty-five years and the average age was thirty-five.

The private patients in this series usually had short stays in the hospital and were discharged as early as four days and as late as twenty-one, with an average of thirteen days in the hospital postoperatively. The patients from the Veterans Hospital went on pass or furlough from nineteen to eighty-nine days, with an average of fifty-three days in the hospital postoperatively. This time in the hospital was lengthened by extenuating circumstances such as associated injuries, distances that the patients had to travel to their homes and home conditions that were not favorable to their best interests.

The decision to use Küntscher nails in the difficult situations presented and the cases illustrated was made after consideration of the various types of fixation of the fractured fragments which included the use of screws, plates, wires, etc. In view of the good results reported by Küntscher[7,22–25] and others[1–3,20,29,40,59,60] the procedure was believed safe and sound. The intramedullary nail is becoming accepted as the treatment of choice in certain fractures of the femur.[8,9,16,19,30,32,34,35,37,44,46,53,55,56,62] It is also being used more widely in the treatment of fractures of other bones.[4–6,12–15,17,18,21,28,31,33,36,38,39,41–43,45] The intramedullary nails seemed to be the best way of holding the reduction in some of our patients having associated injuries that required frequent cast changes or dressings, and in severely comminuted fractures it gave a convenient method of threading the fragments into alignment.

We did not use the technic as described by Griessmann and Schüttemeyer[10] or Westerborn[61] but rather used the open technic in every case. The fracture is exposed by dissection through fascial planes and reduced under direct vision. The nail is introduced from the end of the bone, usually from the distal end except in fractures of the proximal ulna in which the nail is driven down from the olecranon. Comminuted fragments can also be threaded on the nail as it is being driven down. Accessory suture, usually chromic catgut, can be used to hold smaller loose fragments in proper alignment against the reduced fracture. It is believed that the placing of fresh autogenous cancellous iliac chips about the fracture site stimulates osteogenesis and is recommended as a routine adjunct. A cast extending from axilla to base of fingers with elbow at 90 degree flexion and forearm rotated according to level of fractures, and wrist in dorsiflexion is used postoperatively to control rotation of the fragments until there are some clinical and x-ray signs of union. In our series the average time of protection in a cast was 107 days, with a minimum of fourteen and a maximum of 300 days. Those patients treated with supplementary autogenous bone chips at the fracture site were kept in a cast and splints for an average of seventy-three days, with a minimum of nineteen days and a maximum of 120. All of the fractures in this series united clinically and

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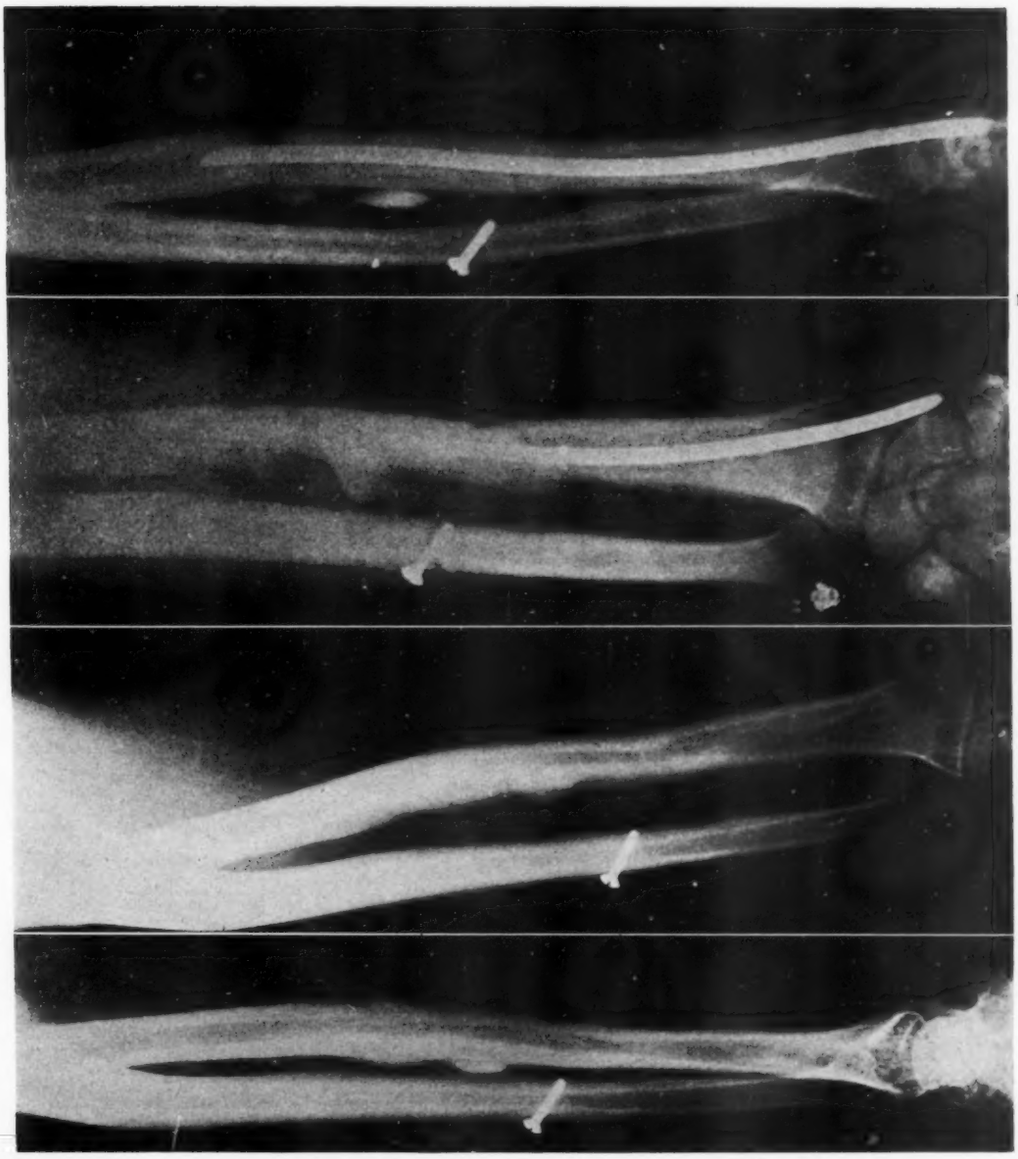

FIG. 1. Case 1. A, shows nail in radius with central fragment threaded on the nail; B, twenty months after extraction of nail.

radiologically except one in which merthiolate bank bone was used with subsequent resorption of the graft.

In the following case histories a real fracture problem can be recognized in each. In all of the cases except that of a fifty-four year old woman with comminuted fractures of both bones of both forearms and a compound both bone fracture in a twenty-seven year old male, some other method of reduction and fixation had been attempted but failed.

We have made a complete photographic survey of these cases before and after operation, including their appearance after complete healing or after the nails were removed; also of the functional results. These illustrations form such a voluminous exhibit that we have limited our illustrative material for publication to pertinent situations which reflect the various problems involved without duplication.

CASE REPORTS

CASE 1. R. H., a forty-two year old white man, sustained a simple comminuted fracture of the middle third of the right radius and an oblique fracture of the middle of the right ulna

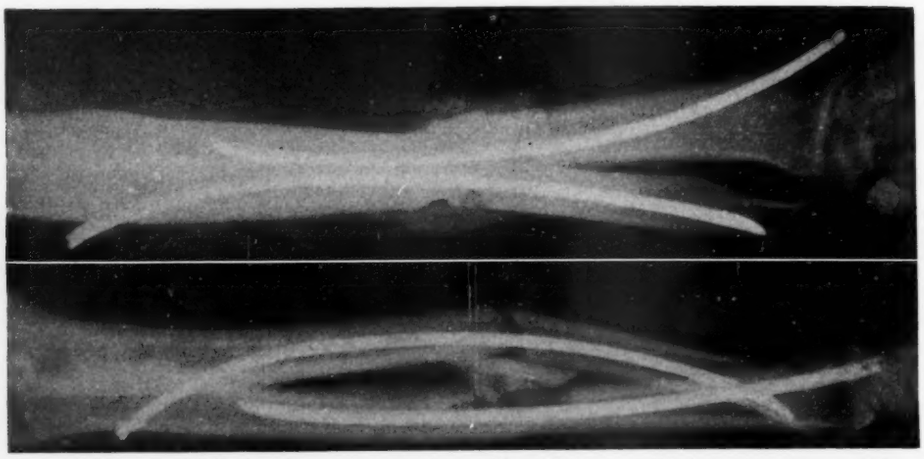

FIG. 2. Case II. Nails in place; synostosis at site of fracture. Patient compensated for limitation of motion. Removal of nails permitted six months after operation.

on December 23, 1949. He also had a fractured right femur. The initial treatment for the forearm was manipulation and cast. However, as the fracture was unstable, Küntscher nailing of the radius and screw fixation of the ulna were done on January 3, 1950. The separated fragment in the center of the radius was threaded on the nail. (Fig. 1A.) The patient wore a cast for 129 days postoperatively and then began use of his arm. The nail was removed on August 21, 1950. (Fig. 1B.) On May 21, 1951, he had full painless range of motion.

CASE II. S. S., a thirty-eight year old white man, had a comminuted fracture of the midshaft of the right radius and ulna on June 18, 1948. The initial treatment was manipulation, with traction and cast. This was unsuccessful and on June 22nd he had an open reduction with insertion of Küntscher nails in the radius and ulna, and iliac chip grafts were placed about the fracture sites to stimulate osteogenesis. A curved Küntscher nail was used in the ulna which created a deformity. This in turn resulted in too close proximity of the bones, and synostosis ensued at the fracture site. (Fig. 2.) It is believed that the straight Küntscher nail should be used in the ulna, which is essentially a straight bone. Examination in 1951 showed limitation of pronation and supination, but all other joint motions were normal and strong. The patient was well satisfied with the result and would not permit further surgery to correct limitation of rotation. He wore a cast for forty-three days postoperatively and then began motion. The nails were removed on February 1, 1949. Union was solid prior to this time.

This was our first attempt to use this technic in the forearm. From this experience we profited materially and did not make the evident mistakes again. However, the patient was happy with the result.

CASE III. C. R., a thirty-one year old white man, sustained compound comminuted fractures of the middle third of the right radius and ulna, simple fracture of the left humerus and a fractured right patella on October 16, 1950. The initial treatment consisted of débridement, suture and casting. The fractures were not stable and on October 31st open reduction was done, with Küntscher nailing of the radius and ulna. Iliac chip grafts were used at the fracture sites. The patient wore a cast for sixty-six days postoperatively and then began active use of the forearm. The nails were removed on August 29th. On November 4th examination showed full painless range of motion except for lack of 25 per cent of full supination.

CASE IV. A. J., a twenty-two year old white man, sustained a simple fracture of both bones of the left forearm on November 27, 1949. The initial treatment was with manipulation and cast. However, the fracture was unstable and so on the following day Küntscher nailing was done on both bones. (Fig. 3.) The patient wore a cast for ninety-four days postoperatively and then began active use of the extremity. The nails were removed on April 14, 1950. He entered Army Service in June, 1951, and at last report in April, 1952, was doing full duty. Contrast this result with that of Case II.

CASE V. C. G., a fifty-four year old woman, incurred simple comminuted fractures of the

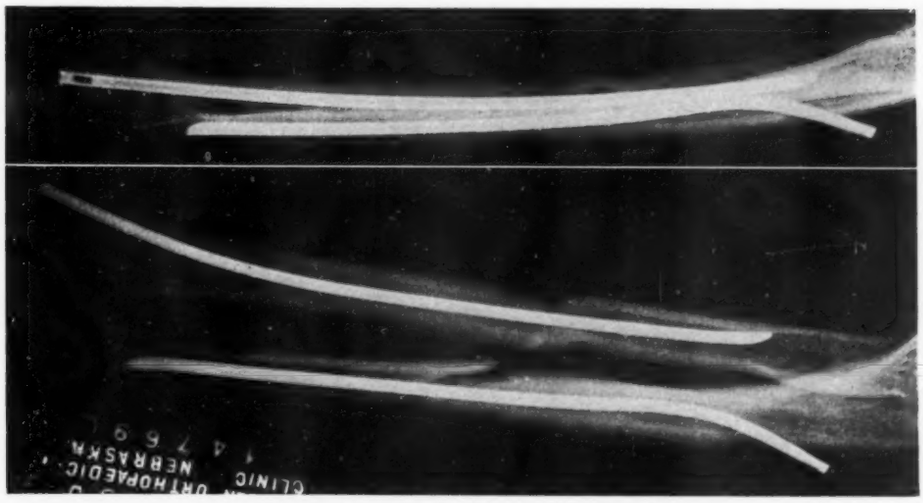

FIG. 3. Case IV. Before removal of nails.

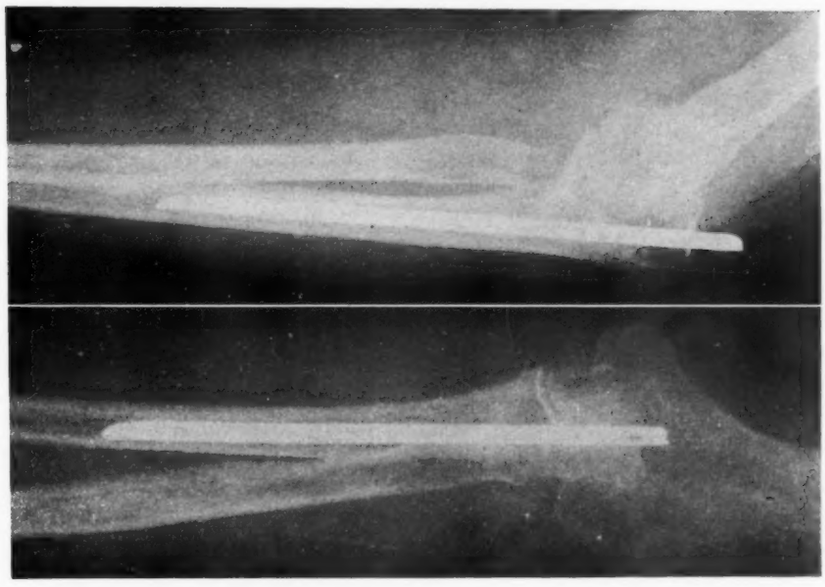

FIG. 4. Case V. Left forearm before removal of nail.

proximal one-third of both ulnas and fractures with displacement of the radial heads on July 11, 1950. She was treated with icebags and sling for twenty-four hours, followed by Küntscher nailing of both ulnas and removal of both radial heads. (Fig. 4.) Iliac chips were placed around the ulnar fracture sites. She wore a cast for nineteen days postoperatively and then began active motion. The nails were removed on January 22, 1951. Recheck examination in March, 1951, showed normal, painless range of motion in both arms. She subsequently refractured her right arm in September, 1951, in a fall. This was treated elsewhere by a splint and resulted in a pseudarthrosis. In spite of the pseudarthrosis she has a normal range of motion but has decreased stability in the right elbow. She has declined further surgery. This is a bilateral Monteggia fracture. It is believed that the early motion allowed by the removal of the radial head and the fixation of the ulna is responsible for the full range of motion.

CASE VI. I. T., a twenty-one year old white man, was admitted in March, 1948, with compound comminuted fractures of the left radius and ulna, and a partial amputation of the left thumb incurred on the day of admission when he caught his arm in a post-hole digger. Because of shock only débridement and immobilization were employed. Two days later the ulna was

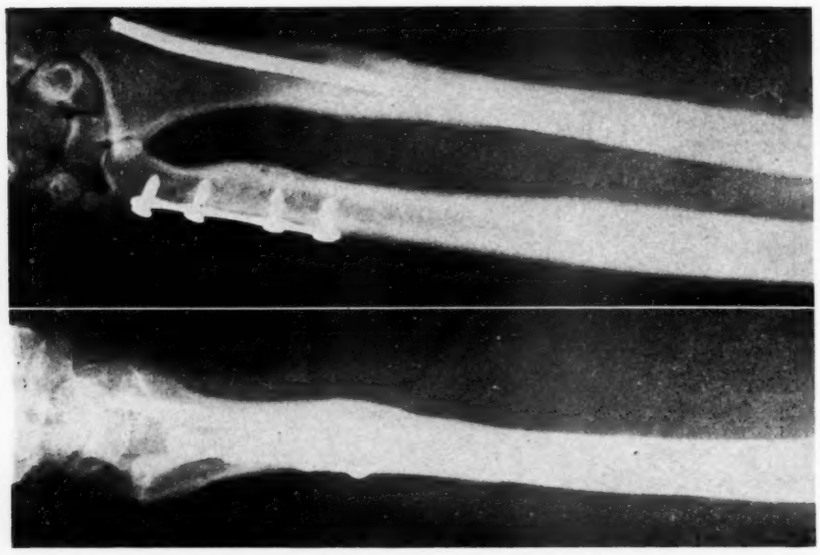

FIG. 5. Case VI. Before removal of nail and plate.

plated and a closed reduction was done on the radius. This was followed by skin-grafting procedures to the thumb. The reduction of the radial fracture was lost and in April, 1948, Küntscher nailing of the radius with iliac chip grafts was performed. The forearm was casted for 110 days postoperatively. On recheck examination in October, 1951, the fractures were well healed and range of motion was normal except for limitation of pronation and supination of the left forearm. (Fig. 5.) Subsequently, resection of the distal end of the ulna was performed because of malunion which interfered with pronation and supination. At the same time the nail and plate were removed. The patient then recovered rotating motion and in March, 1952, was doing heavy farm labor without disability. All motions were normal and painless except for a lack of 15 degrees of full supination.

The x-rays of both arms were practically identical, as were the end results. Therefore, only the lateral view (Fig. 5.) is reproduced.

CASE VII. L. E., a thirty year old white man, entered the hospital in November, 1948, with a history of a compound fracture of both bones of the right forearm sustained two months previously when he caught his arm between the belt and pulley in a feed grinder. The initial treatment had been débridement and primary suture with case immobilization. The initial reduction had been lost. One month later he had Küntscher nailing of the radius and ulna with iliac chip graft. The arm was casted for four months postoperatively. Following this he resumed his previous occupation as a farmer. In October, 1949, the nails were removed and a plastic revision of the cicatrices from the original compound injury and removal of an exostosis of the radius were done. He resumed employment two weeks later. Examination in April, 1952, showed normal range of motion except for limitation of pronation and supination to 6 degrees from a position of mid-pronation. He is a farmer and is able to do full work.

CASE VIII. W. F., a twenty-seven year old white man, was admitted in April, 1949, with a compound fracture of the right radius and ulna incurred when he caught his arm between a belt and pulley in a feed grinder. He also had an avulsion of the skin of the right thumb. The forearm wound was ragged and extended over 5 inches. Débridement and Küntscher nailing of radius and ulna were done primarily. (Fig. 6A.) The distal portion of the thumb subsequently became gangrenous and had to be removed. The arm cast was discontinued two weeks postoperatively. The distal portion of the thumb was grafted with split-thickness grafts and later reconstructed with an abdominal tube pedicle graft. The intramedullary nails were removed from the forearm in April, 1950, and a resection of the distal end of the ulna was done. (Fig. 6B.) On recheck examination in October, 1950, eighteen months following the original accident, the right forearm showed

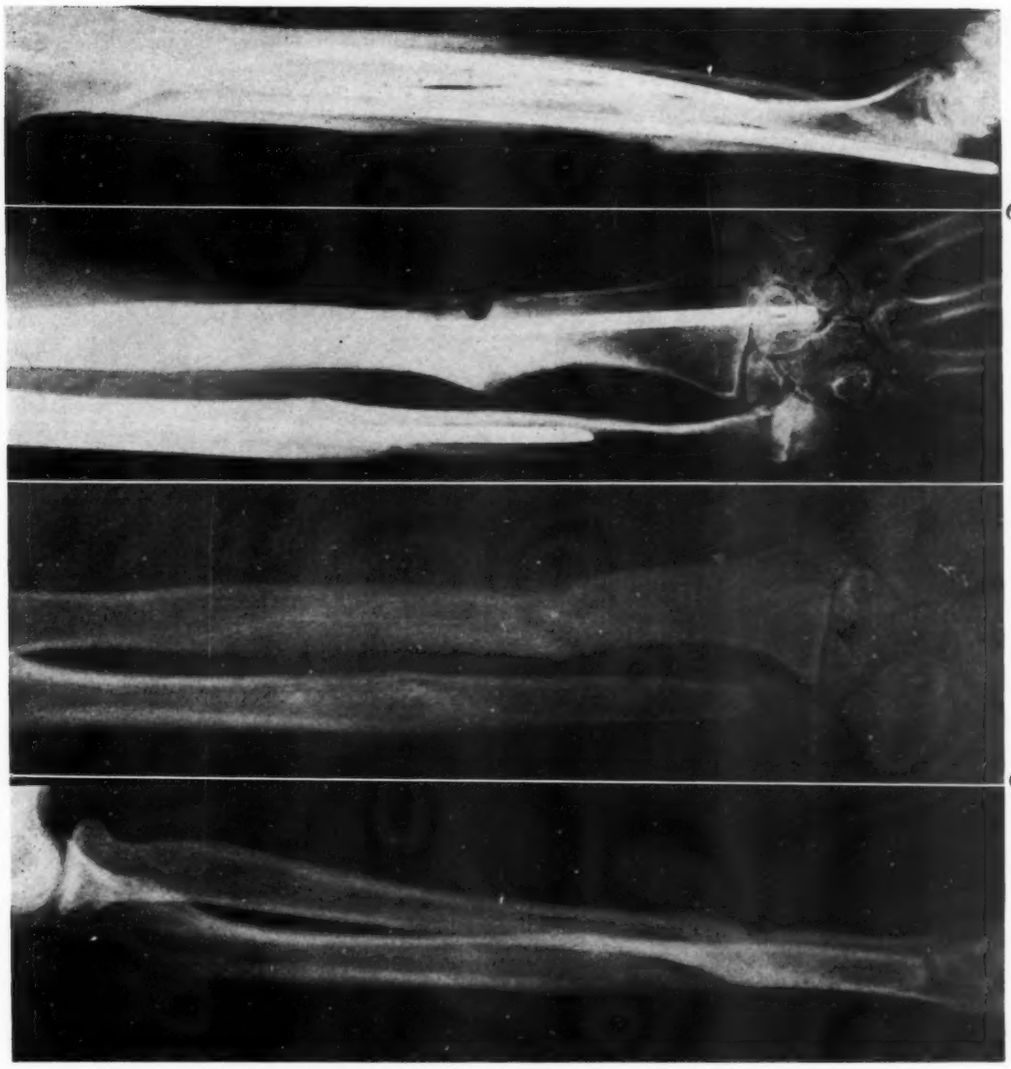

FIG. 6. Case VIII. A, with nails in place; B, after removal of nails.

complete range of motion except for pronation and supination which lacked 10 degrees as compared to the opposite side.

CASE IX. H. R., a fifty-five year old man, was admitted on August 22, 1950, with comminuted fractures of the left radius and ulna incurred in an automobile accident on the day of admission. His history showed that he had been in a psychiatric hospital for ten years for psychosis secondary to central nervous system lues. Two days after admission Küntscher nailing of the left forearm was done under brachial block anesthesia. Comminuted fragments of ulna were ground up and used in lieu of iliac chips. He wore a cast for three months postoperatively and then began use of his arm. He was advised to have the nails removed but he went to another state and no further follow-up was possible except for a letter from the patient which stated he was using the arm without difficulty.

CASE X. W. S., a thirty-four year old white man, entered the hospital in August, 1948, with fracture of both bones of the right forearm and multiple other injuries sustained in an automobile accident on the day of admission. Initial closed reduction of the forearm fracture was done but this was subsequently lost. Open reduction and internal fixation, with plate and screws, was done three weeks after injury. Nine months postoperatively non-union was evident and Küntscher nailing of the radius was done, with iliac chip graft across the fracture site. The forearm was casted for two months post-

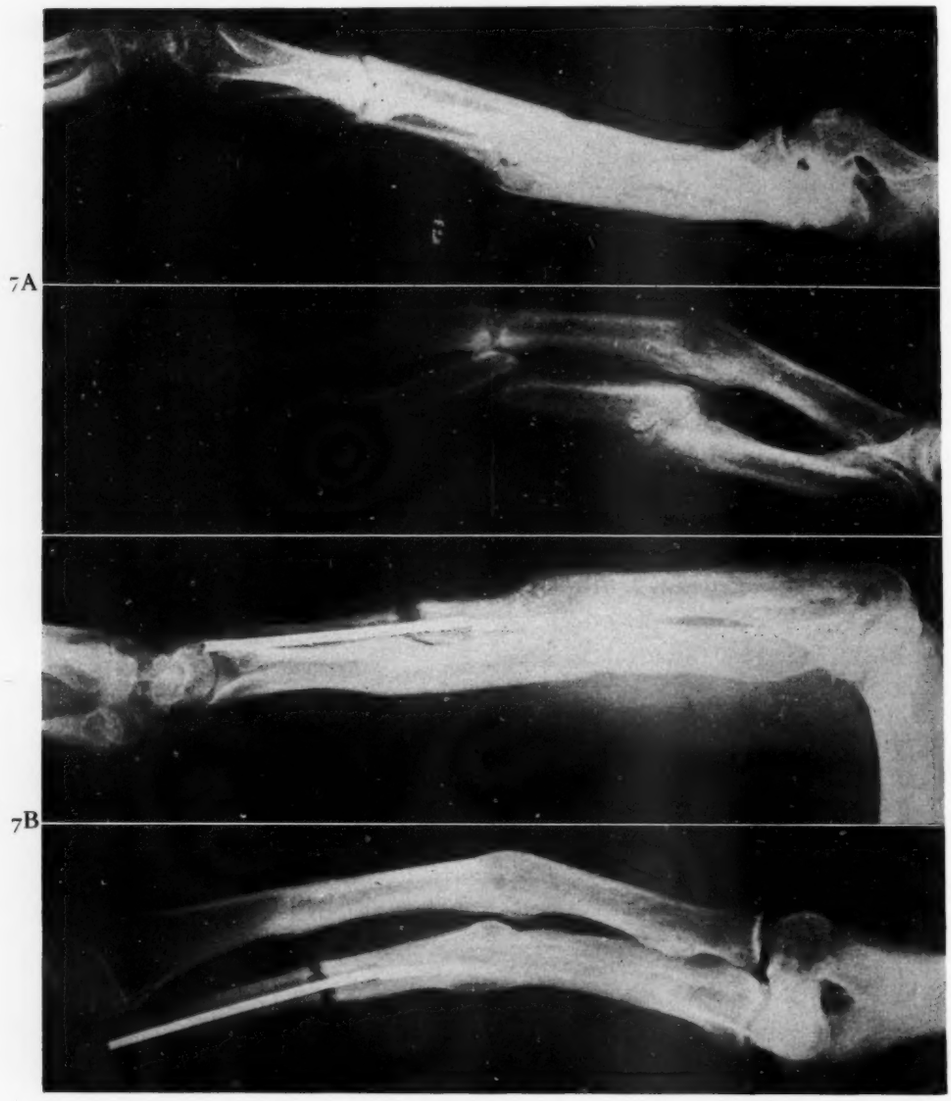

FIG. 7. Case XII. A, with established non-union; B, after nailing and resorption of graft.

operatively. The nail was removed in March, 1950. At that time there was normal range of motion except for minimal limitation of pronation.

CASE XI. F. W., a twenty-four year old white man, had a compound fracture of the left radius and ulna and extensive soft tissue injury when he caught his forearm between a belt and pulley in August, 1950. The initial treatment consisted of débridement and suture and casting. The ulna reprotruded through the skin as the reduction was lost. Traction by means of Kirschner wires was instituted above and below until soft tissue healing was complete. In October, 1950, a Küntscher nail was inserted into the radius and the ulnar fracture was transfixed with a screw. The wound over the ulna broke down postoperatively and later required skin grafting for closure. After six months the radius united but there was non-union of the ulna. The Küntscher nail was removed from the radius and an iliac bone graft was placed across the ununited fracture of the ulna. After four months of cast immobilization this united and the patient began active use of his arm. Recheck examination showed normal motion except pronation and supination limited to 10 degrees from position of mid-pronation.

CASE XII. T. B., a forty-two year old white man, was admitted on January 1, 1950, with a ruptured bladder and a fractured femur, pelvis and both bones of the left forearm. He had

emergency splinting of his fractures and surgery for the ruptured bladder. Eighteen days later Küntscher nailing of the left femur was done with iliac bone graft and the forearm was treated with cast immobilization. The ulna did not unite after eight months (Fig. 7A.) and in August, 1950, Küntscher nailing of the ulna was done with merthiolate bone bank iliac chips. The patient was in a cast for eight months postoperatively. Upon removal of the last cast the Küntscher nail was found to be broken approximately 1 inch proximal to the fracture site. The graft had absorbed and the ulna had not united. He was seen again in October, 1951, at which time he showed practically normal range of pronation and supination of his left forearm but the motion was occurring at the site of the ulnar non-union, using the Küntscher nail as a pivot. (Fig. 7B.) The arm was asymptomatic and the patient was using it in heavy manual labor. In view of the excellent function he could not be convinced of the need for further surgery. Recheck examination in April, 1952, showed essentially no change. The patient was a truck driver and combine operator and would do heavy work up to sixteen hours a day without discomfort. He stated that he had greater functional use of the forearm because his prior fracture deformity had left him with no pronation or supination.

RESULTS

The use of the Küntscher intramedullary nail in this series of problem cases of forearm fractures we believe speeded convalescence and reduced hospitalization time to an average of twenty-one days in private practice and fifty-three days in cases of patients treated at the Veterans Hospital. Concomitant with the reduction in time of hospitalization would go the cost of hospitalization either to the individual himself or to the taxpayer.

With the use of Küntscher nails and supplementary iliac chips in open reductions of the forearm clinical stability is rapid. The patients were maintained in casts until x-ray evidence of healing was present. This was an average of seventy-three days for patients with supplementary grafts and 107 days for all patients in the series.

All of the patients resumed their former occupations and had excellent functional results. The majority of the patients are doing heavy manual labor. Not one patient had pain in his forearm as a residual of the fracture or as a result of the nailing. There were no failures using the Küntscher nail in difficult fractures of the forearm as far as the patients' estimations of results were concerned. One case, however, should be classed as questionable. This case shows resorption of the merthiolate bank graft and there is still no x-ray evidence of union after two years. The patient uses the arm in heavy manual labor; it is asymptomatic and has a full range of motion.

CONCLUSIONS

1. There were nineteen fractured forearm bones in this series of twelve cases. Ten open fractures and nine closed fractures were nailed; of these, eleven were comminuted. One failed to unite clinically and radiologically, and all were reduced and maintained by the use of Küntscher forearm nails.

2. Including open and comminuted fractures we believe the hospital stay postoperatively was shortened by the use of the Küntscher nail, the average being thirteen days in private cases and fifty-three days in Veterans Hospital cases.

3. There were no complications due to using Küntscher nails in compound fractures.

4. Cancellous bone chip grafts about the fracture site appeared to hasten union.

5. The intramedullary Küntscher nails succeeded in maintaining reduction and allowing early return of function in forearms where other methods had been tried and had failed.

6. The Küntscher nail is recommended as a valuable adjunct in the treatment of selected fractures of the forearm.

REFERENCES

1. Böhler, L. Intramedullary nailing (Küntscher method) in fresh fractures. (Abstr.) *Bull. War Med.*, 4: 16, 1943.
2. Böhler, L. Medullary Nailing of Küntscher. Baltimore, 1948. Williams & Wilkins Co.
3. Böhler, L. and Böhler, J. Küntscher's medullary nailing. *J. Bone & Joint Surg.*, 31A: 295–305, 1949.
4. D'Aubigne, R. M. Surgical treatment of non-union of long bones. *J. Bone & Joint Surg.*, 31-A: 256–266, 1949.
5. Dickson, J. A. Intramedullary fixation of certain fractures of both bones: two cases. *Cleveland Clin. Quart.*, 11: 62–66, 1944.
6. Fitts, W. T., Jr. et al. Effect of intramedullary nailing on healing: experimental study. *Surg., Gynec. & Obst.*, 89: 609–615, 1949.
7. Fraenkel, G. J. Intramedullary nailing: practice at Kiel. *Lancet*, 2: 387–388, 1948.

8. Fowler, S. B. and Riordan, D. C. Femur fractures—internal fixation with Küntscher intramedullary nail. *South. M. J.*, 42: 545–551, 1949.
9. Grebe, A. A. Fractures of the shaft of the femur. *Am. J. Surg.*, 80: 161–169, 1950.
10. Griessmann, H. and Schüttemeyer, W. Weitere Erfahrungen mit der Marknagelung nach Küntscher an der Chirurgischen Universitätsklinik Kiel. *Chirurg.*, 17–18: 316–333, 1947.
11. Groves, E. W. H. Ununited fractures with special reference to gunshot injuries and the use of bone grafting. *Brit. J. Surg.*, 6: 203–247, 1918–1919.
12. Haebler, C. Experiences with the marrow nail operation according to the principles of Küntscher. *U. S. Nav. M. Bull.*, 49: 423–473, 1949.
13. Haebler, C. Fresh compound fractures, part II. *U. S. Nav. M. Bull.*, 49: 626–644, 1949.
14. Haebler, C. Fractures healed with deformity, old fractures with deficient callus formation and pseudarthrosis, part III. *U. S. Nav. M. Bull.*, 49: 831–862, 1949.
15. Haebler, C. Fractures of the humerus, part IV. *U. S. Nav. M. Bull.*, 49: 1033–1066, 1949.
16. Haebler, C. Gunshot fractures of the femur, part V. *U. S. Armed Forces M. J.*, 1: 175–202, 1950.
17. Haebler, C. Tibia fractures, part VI. *U. S. Armed Forces M. J.*, 1: 175–202, 1950.
18. Hedri, E. Results with medullary nailing. *J. Internat. Coll. Surgeons*, 11: 191–193, 1948.
19. Hucherson, D. C. Medullary fixation of femoral shaft fractures. *Am. J. Surg.*, 80: 666–668, 1950.
20. Hussein, M. K. Intramedullary nailing. *J. Roy. Egyptian M. A.*, 32: 512–522, 1949.
21. Knight, R. A. and Purvis, G. D. Fractures of both bones of forearm in adults. *J. Bone & Joint Surg.*, 31-A: 755–764, 1949.
22. Küntscher, G. Die Marknagelung von Knochenbruchen. *Arch. f. klin. Chir.*, 200: 443–455, 1940.
23. Küntscher, G. Marrow nailing—medullary nailing. Symposium: Project II, folio 1–5a, translated by U. S. Naval Technical Unit, Europe (Medical Section), Office of the Naval Advisor, Office of the Military Government (U. S.).
24. Küntscher, G. Intramedullary splinting. *M. Bull., Chief Surgeon, European Command*, 3: 5–8, 1947.
25. Küntscher, G. Brief review of the present status of marrow nailing. Office of Military Government (U. S.) Office of the Naval Advisor, Medical Section, April 17, 1948.
26. Lambotte, A. Technique et indications de la prothese perdue dans le tratement des fractures. *Presse méd.*, 17: 321–332, 1909.
27. Lambrinudi, C. Intramedullary Kirschner wires in the treatment of fractures. *Proc. Roy. Soc. Med.*, 33: 152–157, 1940.
28. Lezius, A. Intramedullary nailing of intertrochanteric and subtrochanteric fractures with curved nail. *J. Internat. Coll. Surgeons*, 13: 569–572, 1950.
29. Lindvall, S. Küntscher's medullary nailing. *Acta. chir. Scandinav.*, 100: 522–529, 1950.
30. Lloyd-Roberts, G. C. Intramedullary nailing in recent fractures of the femoral shaft. *Lancet*, 1: 711–713, 1951.
31. Long, R. D. and Fett, H. C. Medullary canal wire transfixion in metacarpal and forearm fractures. *U. S. Nav. M. Bull.*, 44: 253–256, 1945.
32. Lottes, J. O. Treatment of fractures of femur with a heavy, large cored, three-flanged medullary nail. *Surgery*, 29: 868–884, 1951.
33. MacAusland, W. R. Treatment of fractures of olecranon by longitudinal screw or nail fixation. *Ann. Surg.*, 116: 293–296, 1942.
34. MacAusland, W. R. Medullary nailing of fractures of the long bones. *Surg., Gynec. & Obst.*, 84: 85–89, 1947.
35. Magee, R. K. Kuntscher method of intramedullary pin fixation. *Canad. M. A. J.*, 56: 65–70, 1947.
36. Morgan, H. W. Practical aspects of nailing. *Radiology*, 48: 172–179, 1947.
37. Morris, H. D. Present status of intramedullary fixation of femoral fractures. *Bull. Tulane M. Fac.*, 10: 69–71, 1951.
38. Murphy, A. L. Present status of internal fixation of fractures. *Canad. M. J.*, 52: 582–587, 1945.
39. Murray, G. Use of longitudinal wires in bones. *Am. J. Surg.*, 67: 156–167, 1945.
40. Nicolaysen, J. Lidt om diagnosed og behandlingen of fr. colli femoris. *Nord. med. Arkiv.*, 8: 1–19b, 1897.
41. Patterson, J. C. Intramedullary nailing of fractures of long bones. *J. M. A. Georgia*, 39: 232–236, 1950.
42. Pelitier, L. F. Nail design: an important safety factor in intramedullary nailing. *Surgery*, 28: 744–748, 1950.
43. Pelitier, L. F. Theoretical hazards in Küntscher intramedullary nail. *Surgery*, 29: 466–472, 1951.
44. Reynolds, F. C. Treatment of fractures of femoral shaft with medullary nail. *J. Missouri M. A.*, 48: 281–284, 1951.
45. Rush, L. V. and Rush, H. L. Reconstruction operation for comminuted fractures of the upper third of the ulna. *Am. J. Surg.*, 38: 332–333, 1937.
46. Rush, L. V. and Rush, H. L. Technique of longitudinal pin fixation of certain fractures of the femur. *J. Bone & Joint Surg.*, 21: 619–626, 1939.
47. Rush, L. V. and Rush, H. L. Evolution of medullary fixation by longitudinal pin. *Am. J. Surg.*, 78: 324–333, 1949.
48. Rush, L. V. and Rush, H. L. Medullary pin fixation of fractures near joints. *Mississippi Doctor*, 27: 260–267, 1949.
49. Rush, L. V. and Rush, H. L. Technique of longitudinal pin fixation. *Mississippi Doctor*, 27: 284–288, 1949.
50. Smith, H. Intramedullary fixation. *J. Bone & Joint Surg.*, 32-A: 464–465, 1950.
51. Socur, R. Intramedullary nailing of diaphysial fractures. *J. Bone & Joint Surg.*, 28: 309–331, 1946.
52. Stephens, C. Femoral intramedullary nailing in an aged pointer. *Vet. Med.*, 46: 117, 1951.
53. Street, D. M., Hansen, H. H. and Brewer, B. J. Medullary nail: presentation of new type and report of case. *Arch. Surg.*, 55: 423–432, 1947.
54. Street, D. M. Medullary fixation of the femur. *Memphis M. J.*, 23: 184–185, 1948.

55. Street, D. M. Medullary nailing of the femur. *J. A. M. A.*, 143: 709–714, 1951.
56. Thomson, J. E. M. Küntscher nail technique for fractures of femoral shaft. *J. Internat. Coll. Surgeons*, 14: 166–187, 1950.
57. Tordoir, B. M. and Moeys, E. J. Treatment of certain types of fractures with V_2A steel nail in medullary cavity (Küntscher method). *J. A. M. A.*, 128: 792–794, 1945.
58. Venable, C. S. Internal fixation of fractures, p. 83. Springfield, Ill., 1947. Charles C Thomas.
59. Watson-Jones, R. et al. Medullary nailing of fractures after fifty years. *J. Bone & Joint Surg.*, 32-B: 694–729, 1950.
60. Westerborn, A. Nailing in the marrow cavity in cases of recent fracture and pseudarthrosis. *Acta chir. Scandinav.*, 90: 89–104, 1944.
61. Westerborn, A. Marrow nailing of recent fractures, pseudarthrosis and bone plastic. *Ann. Surg.*, 127: 577–591, 1945.
62. Wiggins, H. E. and Lewis, G. B. Intramedullary fixation of fractures of the femur. *U. S. Nav. Med. Bull.*, 48: 161–174, 1948.

Experimental results obtained by Greever and co-workers indicate that large free cutis grafts survive and form an excellent material to cover very large congenital diaphragmatic defects, and postoperatively there is no great tendency toward development of a diaphragmatic hernia. Marked adhesions develop, fixing the adjacent abdominal and pleural surfaces; however, clinically this produces no harmful result and, physiologically, circulation through these adhesions and between the surrounding diaphragm and the large skin graft are the two factors that keep this graft alive. Using a Padgett dermatome on the donor site and following a split procedure, first the superficial skin surface was removed to a depth of .01 inch and then the underlying cutis was cut to a depth of .02 inch. It is this cutis which is used to overcome the large diaphragmatic defect. The remaining epidermal flap, which is attached to the skin at one end, is then replaced and fixed to the donor site. (*Richard A. Leonardo, M.D.*)

INTRAMEDULLARY FIXATION OF FRACTURES OF THE FOREARM

EVALUATION OF TWENTY SUCCESSIVE UNSELECTED CASES

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THE many difficulties attending restoration of function after fracture of the shaft of the bones of the forearm are well recognized by all fracture surgeons. Rush was the first to employ intramedullary pinning in the management of such injuries when in 1936 he treated a compound comminuted Monteggia fracture by fixation with a Steinmann pin and encircling wire loops.[1–3] He later developed a pin to be used for intramedullary fixation of various fractures including the forearm.[4–9] Dickson,[10] Long and Fett,[11] Tordoir and Moeys,[12] Soeur,[13] MacAusland,[14] Böhler,[15] Westerborn,[16] Stuck and Thompson,[17] Lauritzen,[18] Knight and Purvis,[19] Schwartz and Harmon,[20] Bush,[21] Vanlerenberghe and Lacheretz,[23] Landelius,[24] Palmer[25] and others have subsequently reported series of fractures of the forearm treated by various intramedullary methods. Watson-Jones and others[22] review the development of medullary nailing and present many of the difficulties and complications likely to be encountered.

Personal experience with this method of splinting in the forearm began in 1943 when a Kirschner wire or Steinmann pin was used for intramedullary fixation of the ulna in selected cases of single or both bone fracture which did not respond to closed methods. Use of a single Kirschner wire was abandoned early because of the insecure fixation obtained, but use of the Steinmann pin was continued in cases which were initially considered unsuitable for, or failed to respond to, closed methods. Our first intramedullary splinting of the radius was performed on April 26, 1950, using a hip guide wire for fixation. The last intramedullary fixation in this series was performed August 2, 1951. Although closed methods of treatment are preferred and are used when satisfactory reduction can be obtained and maintained, many forearm shaft fractures present difficulties which can be met only by open methods. Intramedullary fixation in these "problem forearms" has proven so satisfactory that evaluation of the difficulties encountered and the results obtained in treating twenty successive fractured forearms of this type in twenty private and service patients appears warranted. The value of this method of fixation in the management of non-union will not be considered here. (Table 1.)

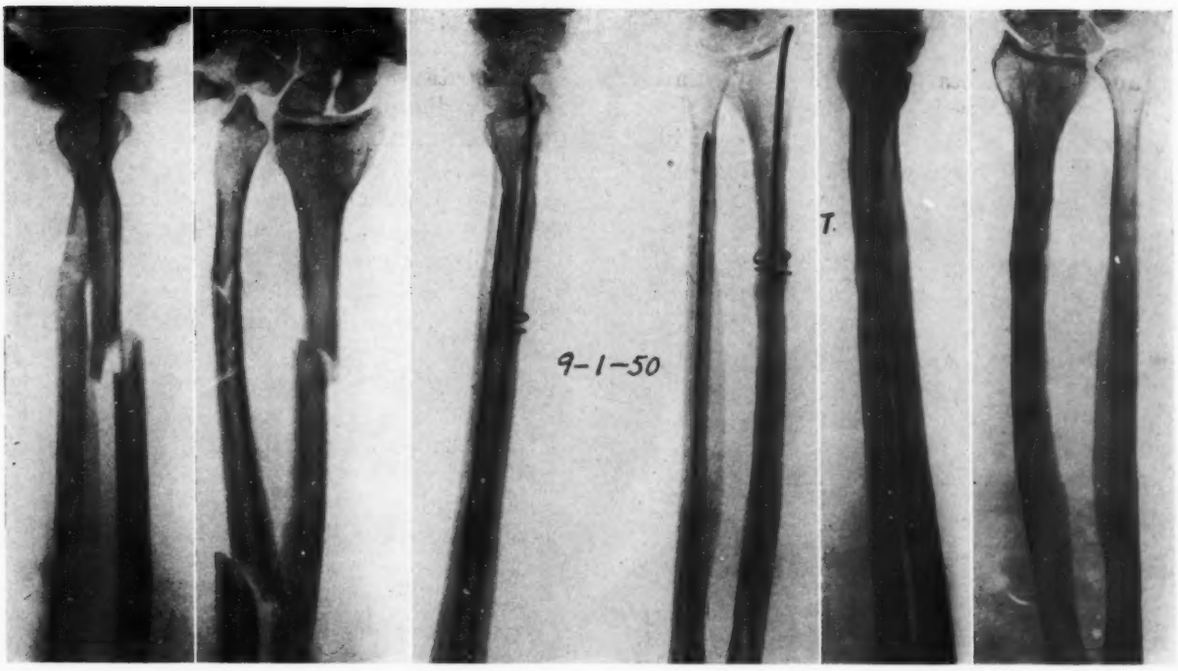
TABLE 1

EVALUATION OF TWENTY SUCCESSIVE UNSELECTED CASES

Age		
18 to 70 years, average 29.3 years		
Nature of injury		
Forearm only (9 simple, 1 compound)		10
Additional severe injuries		10
Deferring forearm pinning (5 simple, 2 compound)	7	
Delay, 12 to 118 days, average 40 days		
Not deferring forearm pinning (3 compound)	3	
Nature of fracture		
Simple		14
Both bones	10	
Radius	3	
Monteggia	1	
Compound		6
Both bones	3	
Ulna	1	
"Sideswipe"	1	
Traumatic amputation distal third of forearm with simple fracture shaft of ulna	1	
Indication for internal fixation		
Fresh fracture		19
Type of fracture initially indicating open methods	16	
Failure of closed methods	3	
Malunited fracture		1
Results		
Bony union (12 simple, 4 compound)		16
Non-union (2 simple, 2 compound)		4
Both bones (2 compound)	2	
Bony union 1 bone, non-union 1 bone (simple)	1	
Single bone fracture (simple)	1	

TECHNIC

The patient is placed in supine position on a fracture table with overhead frame. Traction greatly facilitates the operation and in many instances is indispensable. This is obtained by



1A 1B 1C

FIG. 1. Patient W. H. B., a thirty-three year old woman with simple oblique fracture of both bones (ulna at two levels). Closed reduction unsuccessful; open reduction and fixation both bones. Cast worn seventy-nine days. A, unsatisfactory position of both bones on April 16, 1950. Note old healed Colles' fracture. B, four and a half months after surgery, showing fixation with hip guide wires plus encircling wire loops on radius, and union of both bones. C, end result seventeen months after pinning showing fixation removed.

use of a five-finger "Chinese basket" hand-holding device attached to the overhead frame, suspending the extremity free of the table with shoulder in abduction and elbow at 90 degrees. Countertraction is applied over the distal end of the arm, which is parallel to the floor, by means of a superimposed loop of bandage placed over an underlying pad. From this loop of bandage the amount of weight required to reduce the over-riding of the fragments materially (6 to 10 pounds) is suspended. Unfortunately little control of forearm rotation is obtained. Although this method leaves much to be desired in affording easy access to the radius, it has proven very helpful in spite of this handicap. Blind insertion of the pin was employed in one case; open reduction of the fracture was accomplished in the remaining nineteen cases before the pin was engaged. The radial pin is usually inserted first, as it is ordinarily more difficult than the ulnar, the pin being inserted through the distal end of the radius in the region of the styloid. Ulnar fixation is inserted retrograde through the proximal fragment and out through the olecranon. The pin is then reinserted through the olecranon, across the fracture line and into the opposing fragment under direct vision. Stability of each bone is separately tested by anteroposterior, lateral and rotational pressures. If firm fixation is present, minor fragments can often be well secured by closure of the overlying soft tissues. If firm fixation by pin is not obtained in oblique or comminuted fractures, encircling wires are added. (Fig. 1.) Following final fixation, stability of each bone is again separately determined and two plane x-ray films are made before closure of the incisions. Traction is removed from the distal end of the arm and a cast applied before finger suspension is released.

In compound fractures the usual methods of treatment are followed, namely: débridement and lavage of wound, careful hemostasis, elimination of dead space and placement of the nails and wire loops as in simple cases, when the time interval is less than ten hours and satisfactory cleansing of the wound has been obtained. The decision to employ primary or delayed primary closure of the incision and wounds is made after evaluating the time lag following injury to surgery, the nature of the

fracture, the degree of soft tissue and circulatory damage, the extent of contamination, the thoroughness of cleansing and repair obtained. In four cases primary closure was employed while in two cases sutures were placed at the time of initial surgery and tied three and five days later. Penicillin and aureomycin are given as soon as the patient is seen and following surgery. At the time of operation cultures of the wound are taken and antibotic sensitivity tests are made to determine the antibotic to be subsequently employed. It is believed that adherence to these principles will permit the use of intramedullary fixation in compound fractures considerably beyond the "time lag" now generally accepted. In this series the longest delay from injury to initial surgery was ten hours, although internal fixation was long delayed in two patients because of additional severe injuries.

Although this series is too small to permit far reaching conclusions, it is believed that a sufficient variety of cases is contained herein to permit critical evaluation of principles and methods employed.

Selection of Cases. Initially selected for intramedullary fixation are those adults whose fractures are of a type which obviously cannot be controlled by closed methods and whose general and local conditions permit surgical procedures to the forearm requiring general or nerve block anesthesia. Into this group fall many of the following: transverse, oblique, comminuted or two-level fractures of one or both bones in the middle two-thirds of the shaft, with marked displacement or over-riding of fragments, or with appreciable loss of interspace; Monteggia fracture; "sideswipe" fracture; shaft fracture in an amputation stump; malunion with angulation at site of fracture.

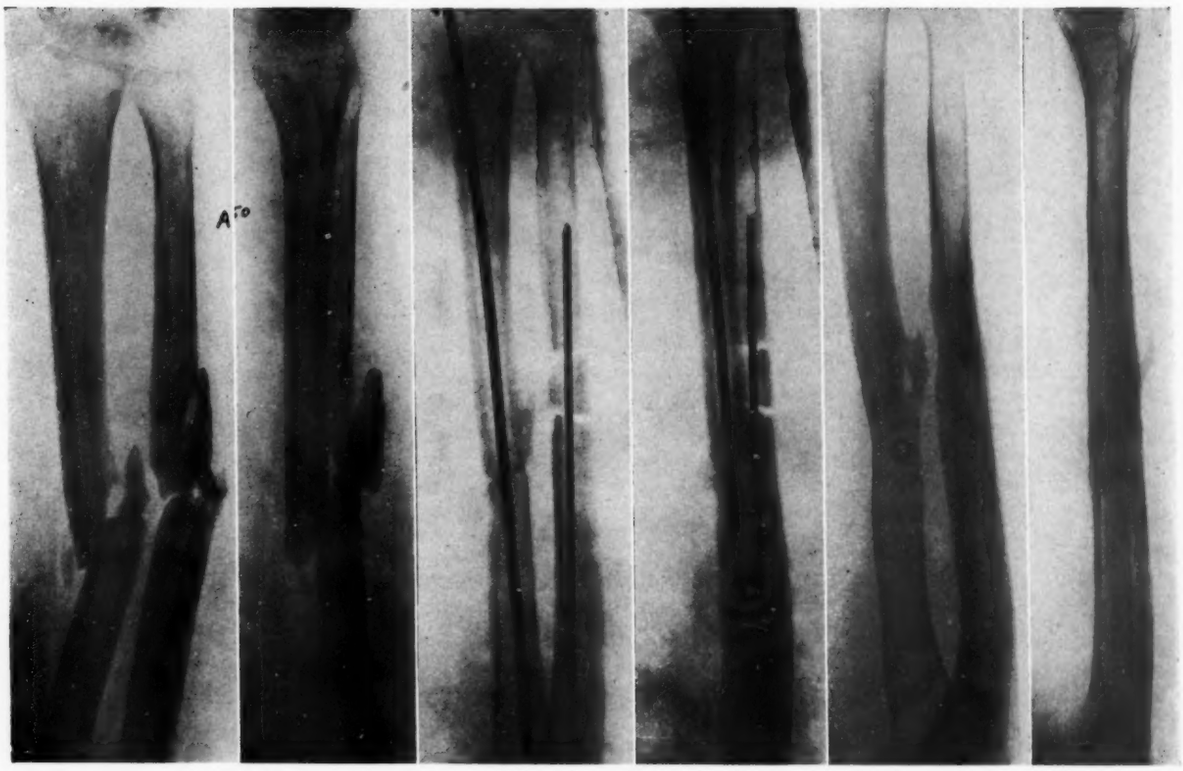
Closed methods are initially used in all other forearm shaft fractures. If adequate fixation cannot be maintained, intramedullary fixation of one or both bones is applied. This procedure is usually performed through a window in the cast when displacement of only the ulna occurs.

Fixation. Intramedullary: The operation is not easy. There are many technical difficulties and the procedure should be used only by experienced fracture surgeons. Great care is necessary to select a fixation device of proper length and diameter for each case. A fixation device extending practically the entire length of the bone and of maximal diameter for a snug fit in the medullary canal, yet permitting easy separation and apposition of the fragments on the pin, gives the desired fixation of the fracture. Although small diameter devices will usually maintain interosseus space, they will not prevent over-riding or rotation in oblique or comminuted fractures as well as will one of larger diameter. It appears that the complications of extrusion or intrusion of the fixation device are also less likely when fixation of larger diameter is used. Insertion of a pin of excess diameter may be impossible, may split the fragment or may prevent apposition of the fragments by muscle tension, resulting in delayed or non-union. A medullary reamer was not employed in this series although it has recently been necessary to use a hip guide wire for this purpose in pinning a fresh fracture in a young, small-boned woman. Of the various devices employed the Rush pin has proven the most satisfactory.

In both bone fractures the question whether internal fixation should be applied to one or both bones must be answered by evaluating each case. When both bones are fractured obliquely or are comminuted, it is believed that fixation should be applied to each bone. (Figs. 1 and 2.) When one bone is transversely fractured with minimal displacement and stable reduction can be maintained by closed methods, it appears that internal fixation of this bone may often be omitted. If reduction by closed methods cannot be obtained or maintained in the other bone, it should be secured by open reduction and pinning.

In oblique or comminuted fractures, when firm fixation is not obtained by use of the intramedullary device alone, the fixation gained by the addition of encircling wire loops is indicated. This greatly increases the stability of fixation, although it adds the disadvantage of a separate operative procedure for removal, if the danger of pathologic fracture is to be avoided. The use of absorbable materials for this purpose has not proven satisfactory. In two-level fractures the fragment if small may be removed, the opposing fragment ends reshaped, and the fragment replaced and threaded onto the pin. (Fig. 2.) When the middle fragment is larger, pinning is performed in the usual manner. (Fig. 1.)

External: A long arm cast extending from palmar crease to axilla with elbow at 90



2A 2B 2C

FIG. 2. Patient G. P. S., a twenty-two year old man with compound comminuted fractures of both bones of left forearm and left humerus. Severe soft tissue injuries deferred intramedullary fixation of forearm for 118 days. Middle ulnar fragment was removed, reshaped and threaded onto pin between two major fragments in order to avoid bone shortening. Cast worn 100 days after pinning. A, forearm fractures August 18, 1950, three months after injury. B, fixation obtained after open reduction and fixation with two Rush pins. A longer pin is indicated in ulna. C, eighteen months after surgery showing fixation removed, union of both bones and revascularization of interposed ulnar fragment.

degrees and forearm in mid-position was employed in all except two cases and was continued until x-ray evidence of fair union was apparent. Clinical evidence of union is not sufficient test for the removal of either the external or the internal fixation. The time requirement did not differ appreciably in different types of cases, averaging 74.1 days in simple fractures and 78.3 days in compound fractures. In both bone fracture the period of external fixation averaged 76.2 days while in single bone fracture (one case) the period was sixty days. In the Monteggia fracture cast fixation was worn for seventy-eight days, in the "side-swipe" fracture for seventy-seven days and in the traumatic amputation with one bone nailing for thirty-nine days.

In two patients, each with a simple transverse fracture of the radius, no external fixation was employed and active use of the extremity was encouraged. External fixation has been successfully omitted by Rush.[7] Although 50 per cent non-union in this series of two cases does not appear encouraging, external fixation has been omitted in subsequent selected cases of single bone fracture with the hope that results in a larger series will prove more successful. External fixation has not been omitted in both bone fractures.

When cortical union is complete, the intramedullary pins are removed.

Complications. There was no systemic complication and no nerve or vascular complication attributable to treatment followed surgery. There were no infections in the simple fractures. No infection requiring removal of suture or pin developed in the compound fractures although healing of wounds was briefly delayed in two cases. No pathologic fracture resulted from the use of encircling wires.

The only complications of consequence consisted of mechanical difficulties arising from

3A 3B 3C

FIG. 3. Patient R. S., an eighteen year old boy with severe compound comminuted "sideswipe" fracture seen six hours after injury. Initially treated with débridement, internal fixation and primary closure of wound; cast worn seventy-seven days. A, injury on July 20, 1950. B, eight and a half months after fixation with Steinmann pin and two wire loops. Union is present; note intrusion of pin into ulna. C, twenty months after surgery showing fixation removed. Elbow motion 100 degrees; forearm rotation 105 degrees.

the fixation device employed. Extrusion of the pin with local pain or with penetration of the overlying skin occurred in five instances. In three of these a Steinmann pin was used for fixation and in the remaining two a hip guide wire. In one case of Steinmann pin fixation, in a patient with a severely comminuted, compound "sideswipe" fracture, the pin intruded into the bone making removal difficult. Here the initial complication was extrusion of the pin from the olecranon with local pain but without penetration of the skin. By finger pressure the pin was pushed inward to a degree preventing recurrence of the initial complaint but the secondary complication of intrusion followed. Extraction was accomplished only by removing a window from the cortex of the ulna, grasping the pin with hemostat and by longitudinal pressure extruding it through the site of insertion in the olecranon. (Fig. 3.)

Decrease of interosseous space occurred in one instance, in a patient with a comminuted compound fracture involving both bones in whom only the radius was fixed by intramedullary pin. This was the only instance of this complication in the four cases of both bone fracture in which only one bone was pinned.

RESULTS

Bony union as evidenced by x-ray demonstration of trabeculae crossing the fracture line occurred in sixteen cases (80 per cent). Twelve were simple and four were compound fractures; there was 85.7 per cent union in the simple fractures and 66.6 per cent union in the compound fractures.

In fourteen cases of fracture of both bones union occurred in eleven (78.5 per cent). Ten of these cases were simple with union in nine (90 per cent), and four were compound with union in two (50 per cent).

In four cases of single bone fracture union occurred in three (75 per cent). Three of these cases were simple with union in two (66.6 per cent), and one was compound with bony union (100 per cent). Union occurred in the simple Monteggia fracture, in the compound "sideswipe" fracture and in the traumatic amputation through distal forearm with fracture of shaft of ulna.

Non-union occurred in four cases. Two of these presented severely compound comminuted fractures of both bones with extensive soft tissue damage. In one patient, a twenty-seven year old man, both bones were pinned without entirely satisfactory reduction or fixation of the ulna. Non-union of both bones with synostosis occurred. It now appears that more adequate reduction and fixation of the ulna by the addition of encircling wires might have resulted in union. In comparable injuries received by a seventy year old man only the radius was pinned and the sutures were tied on the third postoperative day. Non-union of both bones with decrease of interspace followed. Both bones are now routinely pinned in this type of fracture. The third non-union occurred in a twenty-two year old man with a simple fracture of both bones of the forearm, in whom the oblique fracture of the ulna was fixed by a pin without encircling wire and no internal fixation was applied to the well stabilized

transverse fracture of the radius. Bony union of the radius occurred but non-union of the ulna developed. It is possible that the addition of an encircling wire to the oblique fracture of the ulna might have resulted in union. In the fourth patient, a twenty-seven year old woman, a simple transverse fracture of the radius at junction of middle and distal thirds was secured by a Rush pin. No external fixation was employed. Non-union persisted after eleven months. Bony union occurred in a thirty-seven year old woman with comparable fracture also treated by Rush pin without external fixation. The reasons for these two differing end results are not apparent.

The functional end result is the true test of all fracture treatment. Although a series of comparable cases treated by other methods is not available, it is strongly believed that the functional end results in this series are far superior to similar cases in which we have used other fixation methods. In no patient obtaining union in whom extremity injury was limited to the shaft of the bones of the forearm was active forearm rotation less than 90 degrees, nor was there functional impairment of other joints of the extremity.

In the four patients with non-union excellent painless function with all joint motion approaching normal was present in the two cases of single bone fracture. Further treatment was refused by both of these patients because of their satisfaction with the result obtained. In the two cases of compound fracture resulting in non-union of both bones only the patient in whom both pins were removed because of extrusion complained of appreciable functional disability; the other patient stated that he experienced discomfort only on attempting to lift heavy objects even though the radius was not supported by intramedullary pin. The latter patient refused further treatment because of his age (seventy-one years).

CONCLUSIONS

1. Intramedullary fixation is believed to be the treatment of choice in difficult simple and in selected compound fractures involving the middle two-thirds of the shaft of one or both bones of the adult forearm.

2. When the fracture is oblique or comminuted, additional internal fixation is frequently indicated.

3. Internal fixation should be retained until strong cortical union is demonstrated.

4. If non-union occurs, retention of the intramedullary pin will greatly facilitate subsequent bone-grafting procedures by maintaining alignment and fixation of the fragments.

Acknowledgment: Grateful appreciation is expressed to Dr. John J. Killeffer, Dr. Pyung K. Moon and Dr. Sagar D. Sikand for permitting the inclusion of patients treated in part by them, and to Dr. Paul C. Thompson for his assistance in the preparation of this report.

REFERENCES

1. Rush, L. V. and Rush, H. L. A reconstruction operation for comminuted fractures of the upper third of the ulna. *Am. J. Surg.*, 38: 332, 1937.
2. Idem. A technique for longitudinal pin fixation of certain fractures of the ulna and the femur. *J. Bone & Joint Surg.*, 21: 619, 1939.
3. Idem. Evolution of medullary fixation of fractures by the longitudinal pin. *Am. J. Surg.*, 78: 324, 1949.
4. Idem. A medullary fracture pin for spring-type fixation: as applied to the femur. *Mississippi Doctor*, 27: 119, 1949.
5. Idem. Longitudinal pin fixation in Colles' fracture of the wrist. *South. Surgeon*, 15: 679, 1949.
6. Idem. Medullary pin fixation of fractures near joints. *Mississippi Doctor*, 27: 260, 1949.
7. Idem. The technique of longitudinal pin fixation of fractures of the forearm. *Mississippi Doctor*, 27: 284, 1949.
8. Idem. Pitfalls and safeguards in medullary fixation of fractures with the longitudinal pin. *Mississippi Doctor*, 27: 378, 1950.
9. Rush, L. V. Rationale of intramedullary fixation of fractures by the longitudinal pin. *South. M. J.*, 43: 291, 1950.
10. Dickson, J. A. Intramedullary fixation of certain fractures of both bones of the forearm. *Cleveland Clin. Quart.*, 11: 62, 1944.
11. Long, R. D. and Fett, H. C. Medullary canal wire transfixation in metacarpal and forearm fractures. *U. S. Nav. M. Bull.*, 44: 253, 1945.
12. Tordoir, B. M. and Moeys, E. J. The treatment of certain types of fractures with a V2A steel nail in medullary cavity (the Küntscher method). *J. A. M. A.*, 128: 792, 1945.
13. Soeur, R. Intramedullary pinning of diaphyseal fractures. *J. Bone & Joint Surg.*, 28: 309, 1946.
14. MacAusland, W. R. Medullary nailing of fractures of the long bones. *Surg., Gynec. & Obst.*, 84: 85, 1947.
15. Böhler, L. Medullary Nailing of Küntscher. Baltimore, 1948. Williams & Wilkins Co.
16. Westerborn, A. Marrow-nailing of recent fractures, pseudarthrosis and bone plastic: experiences in 100 cases. *Ann. Surg.*, 127: 577, 1948.

17. Stuck, W. G. and Thompson, M. S. Treatment of fractures of the forearm with intramedullary pins. *Am. J. Surg.*, 77: 12, 1949.
18. Lauritzen, G. K. Medullary nailing; a clinical and critical study. *Acta chir. Scandinav.* (supp. 147), pp. 1–224, 1949.
19. Knight, R. A. and Purvis, G. D. Fractures of both bones of the forearm in adults. *J. Bone & Joint Surg.*, 31 A: 755, 1949.
20. Schwartz, A. A. and Harmon, P. H. Threaded wires and pins for longitudinal medullary fixation of fractures of the humerus, radius, ulna and tibia. *Am. J. Surg.*, 79: 264, 1950.
21. Bush, L. F. The treatment of fractures of the shaft of the radius and ulna. *Pennsylvania M. J.*, 53: 235, 1950.
22. Watson-Jones, R. et al. Medullary nailing of fractures after fifty years. *J. Bone & Joint Surg.*, 32B: 694, 1950.
23. Vanlerenberghe, J. and Lacheretz, M. Intramedullary nailing in 131 fracture cases in forearm. *Lille chir.*, 5: 282, 1950.
24. Landelius, E. Intramedullary pinning with Kirschner wires. *Acta chir. Scandinav.*, 101: 203, 1951.
25. Palmer, I. On the complications and technical problems of medullary nailing. *Acta chir. Scandinav.*, 101: 484, 1951.

Traumatic chylothorax follows serious chest injuries in which the thoracic duct is damaged. Occasionally it also occurs subsequent to a right thoracolumbar sympathectomy and splanchnicectomy for high blood pressure; in these latter instances the duct usually does not require ligation because the injury is apt to be slight and eventually spontaneous healing occurs. Conservative treatment consists, among other things, of repeated thoracentesis, restriction of fluids and a diet rich in vitamins but low in fats. (*Richard A. Leonardo, M.D.*)

RADICAL SURGERY FOR CANCER OF THE EXTREMITIES*

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DESTRUCTIVE and often disfiguring surgical procedures at times have to be carried out in the treatment of advanced cancer of the extremities. As a general rule, these are done as last resort measures. The procedures are extensive and disabling, and it is only natural for patients to postpone any unpleasantness for as long as possible. The surgeon, in the past, has often shared this feeling with the patient. As a consequence, the end results have been very poor. These procedures have been performed only after every other treatment has been attempted and the disease has been allowed to become advanced. For these operations to be curative, they must be instituted when the disease is still comparatively early and yet it is obvious that nothing short of radical surgery will control it. Bulky tumors causing severe pain, hemorrhage or sepsis can often be removed with marked relief for the patient. Even though the surgery is extensive, the operative mortality has been reduced so that the operations can be accomplished as safely as many of the more minor ones. Since the operative mortality rate is low, they should be performed early for malignant processes which historically have been proven uncontrollable by lesser procedures. Surgeons should advocate this type of treatment at a time when *curative* results can be expected. On the other hand, it is certainly in order to prescribe such procedures if the expected results are only palliative. The indications for the various radical procedures should become well known. One should know when an interscapulothoracic amputation is indicated and when it is desirable to perform only scapulectomy, when hemipelvectomy is indicated as contrasted to a thigh disarticulation plus groin dissection.

The results in the cases reported herein are not good. However, as one reviews the cases, it can be seen that each patient came to this institution after all other therapeutic measures had been tried. Even though the disease was extensive in each case, palliation was obtained. The various radical procedures are described, examples of cases given, and an effort is made to point out that these procedures should have been done early in the disease.

INTERSCAPULOTHORACIC AMPUTATION

This is a surgical procedure which removes the upper extremity, the scapula, part of the clavicle and the muscle attachments to the shoulder girdle. In 1836 Dixie Crosby was the first American surgeon to perform a successful extirpation of the shoulder girdle for tumor.[1] The operative mortality has been low. In 1942 Pack described a series of thirty-one unselected cases of consecutive interscapulothoracic amputations without an operative death.[2] In 1947 he reported a five-year survival rate of 45.5 per cent, which was based on eleven patients who were operated upon prior to June, 1941.[3] The procedure is performed uncommonly enough in most general hospitals that it is still somewhat of a surgical curiosity.

Interscapulothoracic amputations are performed for primary malignant tumors of the upper humerus, clavicle, scapula or the immediately surrounding soft tissues without evidence of distant metastases. Occasionally, axillary lymph nodes containing cancer metastatic from somewhere on the extremity or occurring after radical mastectomy are so bulky and so involve the major vessels that axillary dissection is not feasible. It is possible to excise completely the axillary area beyond the zone of tumor by subjecting such a case to this amputation.

The cases presented in this paper were performed after the manner described by Pack.[2] A linear incision is made over the clavicle and the mid-third of that bone is resected. The incision is carried through the pectoral muscles and the axilla is exposed. The axillary vessels are ligated. The brachial plexus is transected. The posterior field is opened by a skin incision along the vertebral border. The muscle attachments

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1 2

FIG. 1. Case 1. Preoperative photograph showing lymphedema of the arm and forearm developing approximately ten years after mastectomy for carcinoma of the right breast. Patient also presented metastatic disease in the right supraclavicular region which caused brachial plexus irritation resulting in severe pain down her arm.

FIG. 2. Same case. Shows post-interscapulothoracic amputation defect. (Mirror image.)

to the vertebral margins are transected so that the scapula may be raised off the chest wall. The subscapular muscle and the muscle attachments on the lateral margins of the scapula are transacted, and the specimen is removed.

Case Reports

CASE 1. L. B. R.* (No. 489451), a fifty-nine year old white woman, was admitted to the surgical service of the Ohio State University Hospital on November 18, 1948, because of a swollen, painful, right upper extremity.

She had had a mastectomy in another hospital because of carcinoma of the right breast approximately ten years prior to admission. Since then she had had three recurrences and three local operations in about the same area with the time interval between each being about three years. The last recurrence occurred approximately two years prior to admission. She had received deep radiation therapy. About January, 1948, the patient's right upper extremity began to swell and gradually became larger despite x-ray therapy, testosterone injections and stellate ganglion blocks. In the two months prior to admission the patient had been unable to move her right arm without the aid of her other arm and had had pain in the extremity practically continuously.

On physical examination the patient was a moderately well developed and nourished white female in considerable distress. She presented marked edema in the right arm (Fig. 1) with both motor and sensory nerve loss in an irregular pattern.

Since the patient had been able to survive three recurrences of her cancer, since there was no evidence of distant metastases and since her right upper extremity was not only useless but also a definite liability to her, it was decided that radical extirpation was indicated. Therefore, on November 24, 1948, a right interscapulothoracic amputation was performed. (Fig. 2.) It was impossible to resect completely the tumor in her neck and the surgery was considered only palliative. Her postoperative course was benign. The pathologist reported extensive metastatic carcinoma involving the muscles of the chest wall, the axillary nodes and the nerves of the arm.

Immediately after the operation she had mild to moderately severe phantom limb pain. On December 7, 1948, a chest x-ray showed no evidence of metastatic lesions. In September,

* Case of Stanley O. Hoerr, M.D., presented with his permission.

FIG. 3. Case II. Interscapulothoracic amputation surgical specimen as removed for melanoma of the forearm with extensive axillary metastases.

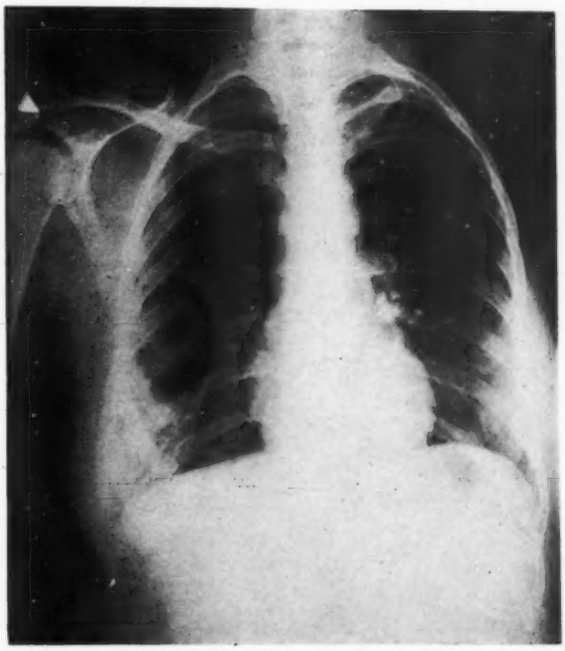

FIG. 4. Case II. Roentgenogram showing defect after left interscapulothoracic amputation.

1949, she showed evidence of some involvement of the left axilla but she stated that she was more comfortable without her arm and shoulder than prior to surgery. Her persistent disease gradually spread and death occurred in October, 1949.

Comment. Only palliation, not eradication of the cancer, was attempted in this case. The desired result was obtained and the patient was well satisfied with the immediate result.

CASE II. E. A. S. (No. 491463A), a thirty-five year old white housewife, was admitted to the surgical service of the Ohio State University Hospital on February 18, 1949, with a chief complaint of "enlarging hard kernels" in her left axilla.

In June, 1948, the patient injured a mole on her left forearm and then noticed that it was enlarging. A few days later the lesion was excised locally by her family physician. In August, 1948, the left axillary nodes began to enlarge. In September a locally recurrent lesion was excised and some left axillary nodes were resected. In November the nodes of the left axilla again began to enlarge and continued to do so.

On physical examination the left axilla was filled with firm, matted, fixed lymph nodes beneath the scar of the previous dissection.

On February 24, 1949, a left interscapulothoracic amputation was performed. The postoperative course was excellent. The pathologist's report was malignant melanoma. (Fig. 3.)

The patient did well immediately postoperatively. She stated that the disability without her arm had been less than it was preoperatively. She did not complain of any imbalance in spite of her deformity. (Fig. 4.) She did the housework of a family of three children. A shoulder prosthesis which weighed only 14 ounces was worn to help maintain body contour. She died August 15, 1950, with brain metastases, approximately eighteen months after surgery.

Comment. This patient was operated upon because of massive involvement of the axillary lymph nodes by melanoma. It was difficult convincing the patient that the operation should be performed since she did not experience much pain or disability from her disease. The difficulty was increased by the fact that her referring physician preoperatively shared her sentiments. Again, the quarterectomy was done after the patient had had several previous surgical procedures. If done earlier the patient might have had a curative result.

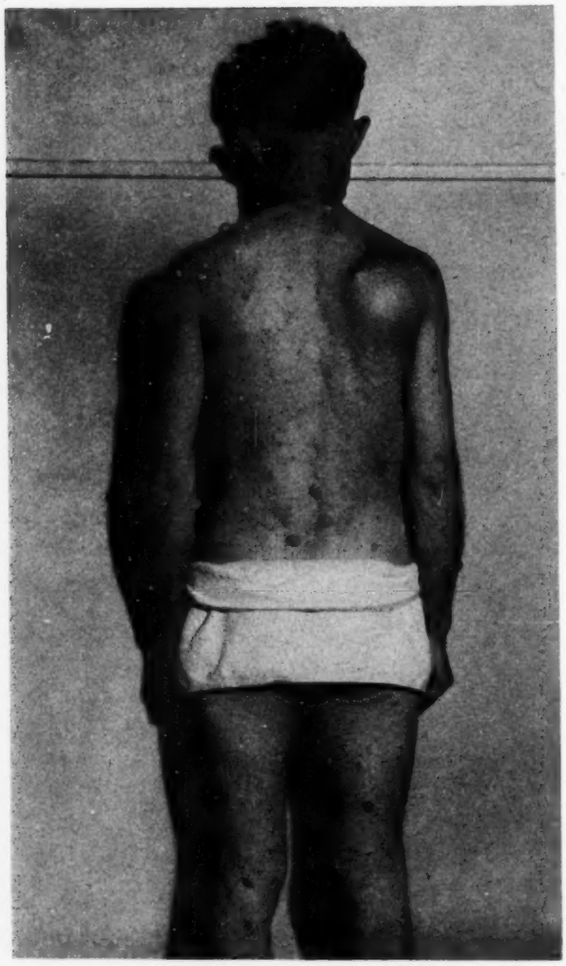

FIG. 5. Case III. Shows multiple neurofibromas which patient had for years. Note tumor over right scapula. This had become malignant and was removed by scapulectomy. Diagnosis: fibromyxosarcoma.

SCAPULECTOMY

Some malignant tumors of the scapula may be treated by removal of this bone, a procedure which is less radical and less deforming than the removal of the entire front quarter. An attempt should be made to save the arm and have a functioning upper extremity if it is thought that the entire tumor can be removed by the excision of the scapula.

The surgical technic has recently been described by Coley[4] in his textbook on neoplasms of bone. In general, skin flaps are developed. The muscles are transected at the vertebral margins. The bone is then elevated to expose the subscapular muscle. The spinatus and teres muscles are transected near their humeral attachments and the shoulder joint is opened. The coraco-acromial ligaments are then divided, and the scapula is removed.

The following patient was treated by scapulectomy. At later dates, however, it was necessary to perform interscapulothoracic amputation and then excision of a local recurrence.

Case Report

CASE III. W. H. J. (No. 490780C), a forty-three year old white man, was admitted to the surgical service of the Ohio State University Hospital on June 1, 1949, because of an enlarging tumor in the right upper back.

He had had numerous small subcutaneous nodules for as long as he could remember and had been followed up in the outpatient clinic for several years with a diagnosis of multiple neurofibromas. During the half year prior to his admission he had noticed gradual enlargement of one of the tumors over the right scapula and, during the three weeks just prior to admission, a quite rapid increase in size of this specific tumor. His father had similar multiple subcutaneous nodules. Over the entire body there were countless subcutaneous, soft, non-tender tumors which varied in diameter from a few millimeters to 3 cm., some of which were colored with a brownish pigment. There was a 15 by 8 cm., firm, non-tender mass over the right scapula which was firmly adherent to it and which did not appear to be pigmented. (Fig. 5.)

On June 8, 1949, a subtotal scapulectomy was performed under general anesthesia. The pathologist's report was fibromyxosarcoma. (Fig. 6.) The postoperative course was uneventful and the patient was discharged on June 22, 1949.

The patient experienced complete relief of pain until October, 1949. At that time he noticed pain and a nodular mass in the region of the operation and since then the gradual appearance of more local subcutaneous nodules. On physical examination the largest of these nodules was 10 by 6 by 2 cm. and was located medial to the right posterior axillary line at about the level of the seventh intercostal space. On October 27, 1949, a right interscapulothoracic amputation was performed. The postoperative course was uneventful.

Some weeks after discharge the patient observed a recurrence of the tumor at the posterior-medial end of the incision. On

physical examination there was a fixed, firm, non-tender, 7 by 7 by 2½ cm. mass present. X-ray films showed no evidence of metastases. On December 24, 1949, local resection of the residual tumor was attempted but was unsuccessful because of invasion of the stump of the axillary vessels.

The patient had rapid progression of his residual disease. He gradually became weaker and expired on April 4, 1950.

Comment. Inasmuch as this patient had a recurrence of the tumor shortly after scapulectomy, the first procedure was not radical enough. At the time of the interscapulothoracic amputation it was realized that there was minimal chance for cure because of the rapid nature of the recurrent growth but it was believed that the radical amputation was necessary for relief of the patient's severe intractable pain. The third operation was a final heroic effort to extirpate the remaining tumor. This patient would have had a better chance for cure if the first procedure had been an interscapulothoracic amputation.

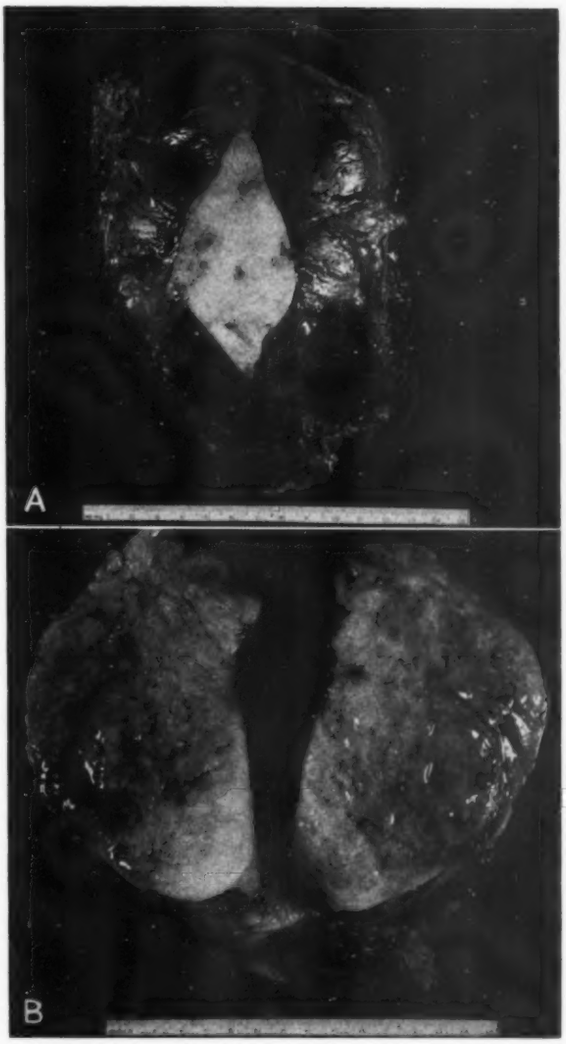

FIG. 6. Case III. A, tumor as removed showing island of attached skin. Specimen contains most of scapula. B, same specimen in cross section.

HEMIPELVECTOMY

Hemipelvectomy, or sacroiliac disarticulation, is an operation that removes the hindquarter and lower extremity. The innominate bone, disengaged at the symphysis pubis and at the sacroiliac joint, is removed with the attached buttock, thigh, leg and foot on the same side. The procedure is mutilating and is a sizable surgical operation. The mortality rate, however, has steadily decreased. In 1947 Pack reported on a group of eight consecutive patients without a death, and for this group, the first of whom was operated upon in 1944, a survival rate of 71.4 per cent.[3]

The number of occasions per year that this procedure is indicated on any one surgical service is few. When it is performed, however, it is the only treatment that has a possible chance of aiding the patient. It is carried out for any primary malignant tumor of the upper femur, hip joint, pelvic bone or that which originates in the surrounding soft structures without evidence of distant metastases. The end results in terms of tumor eradication have not been good because the procedure is delayed until all measures short of radical surgery are tried and because there has already been distant spread before the disarticulation is accomplished. Since it is so feasible to resect widely about the tumor in carrying out the procedure, distant metastases rather than local recurrences are the usual causes of death.

The cases reported herein were performed after the method described by Pack.[5] The anterior skin incision is made from the pubic to the anterior superior iliac spine. The inguinal ligament and rectus muscle are detached from the pubis and the lateral end of the inguinal ligament is detached from the anterior superior iliac spine. The retroperitoneal space is then dissected down to the pelvic vessels. The ureter and bladder are undisturbed and are retracted medially. The external iliac vessels are transected and securely ligated. The

7 8

FIG. 7. Case IV. Shows synovioma of right upper thigh. Patient presented a large, firm mass above the inguinal ligament that was contiguous with the thigh tumor. Note x-ray changes in the skin.

FIG. 8. Same case. Posthemipelvectomy appearance; surgery performed for synovioma of right thigh; healed *per primam*.

symphysis pubis is transected with a Gigli saw. The skin incisions are then completed extending laterally from the region of the anterior superior spine to the gluteal fold to meet its fellow coming inferiorly and posteriorly from the pubic region. The posterior skin flap is elevated to expose the origin of the gluteal muscles. The muscle attachments along the brim of the pelvis are transected, leaving the muscles attached to the innominate bone. The iliopsoas muscle is divided in its proximal portion. The anterior surface of the sacroiliac joint is cleaned of its soft tissue covering, and that joint is divided with hammer and chisel. The muscles inferior to the sciatic notch, as well as the levators, are transected and the specimen is removed.

In both of the cases reported herein it was necessary to enter the peritoneal cavity because a segment of the peritoneum was adherent to the tumor site. In these two cases that segment of peritoneum was entirely circumscribed and left attached to the tumor area. The peritoneal defect was then closed with interrupted silk sutures and the retroperitoneal space was regained. Because of the bulkiness of the tumor in the pelvic hollow it was necessary to leave the spermatic cord with the specimen in both of these cases.

Case Reports

CASE IV. J. N. (No. 488629), a thirty-three year old white man, was admitted to the surgical service of the Ohio State University Hospital on October 20, 1948, with the chief complaint of a tumor of the right upper thigh.

Four years prior to admission a lump developed in the right upper thigh while the patient was in military service. The lesion was biopsied and was only partially removed because the femoral nerve was invaded. Several army laboratories confirmed the diagnosis of synovioma. During the four years prior to admission there was a gradual increase in the size of the right upper thigh as well as some extension above the inguinal ligament. The patient was given large doses of high voltage radiation into the thigh area without effect; he received

Coley's toxin treatments and was given large amounts of teropterin. Just prior to admission the tumor fungated through the surface of the anterior thigh, and the size of the thigh began to increase rapidly.

On physical examination diffuse enlargement of the right upper thigh was present, with an area about 3 cm. in diameter which had eroded through the skin. (Fig. 7.) There was an indefinitely outlined, very firm mass that extended above the inguinal ligament and which measured 8 cm. in diameter.

On October 27, 1948, a right hemipelvectomy was performed. The operator believed that the tumor was completely extirpated. The patient's postoperative course was essentially uneventful. At the time of discharge, the sixteenth postoperative day, the patient was able to ambulate with crutches and his wound was entirely healed. (Fig. 8.) The pathologist's report was synovioma with metastases to the iliac lymph nodes.

The patient adjusted very well to his deformity. He returned to work as an engineer and was able to do desk work for the full eight-hour day. In September, 1949, however, pain developed in the left humeral region. X-ray films showed a destructive lesion. Later a metastasis developed in the seventh cervical vertebra. He expired in November, 1949. Autopsy showed metastases in the left humerus, seventh cervical vertebra and mediastinal lymph nodes. There was no disease in the region of the amputation and no other involved nodes were found.

Comment. This patient was treated conservatively for four years prior to the hemipelvectomy. The initial conservative treatment offered no hope of cure; initial hemipelvectomy might have resulted in complete extirpation of the tumor. Hemipelvectomy did not prevent him from successfully attending to his profession as an engineer and was not associated with phantom limb pain or mental injury.

Case v. J. B. (No. 491425C), a fifty-four year old white man, was admitted on the surgical service of the Ohio State University Hospital on June 18, 1949, with a chief complaint of severe, sharp pain in the right lumbar region, right hip and right lower extremity for about one and a half years.

Eighteen months before the present admission a constant, severe pain developed in the right lumbar region which gradually increased

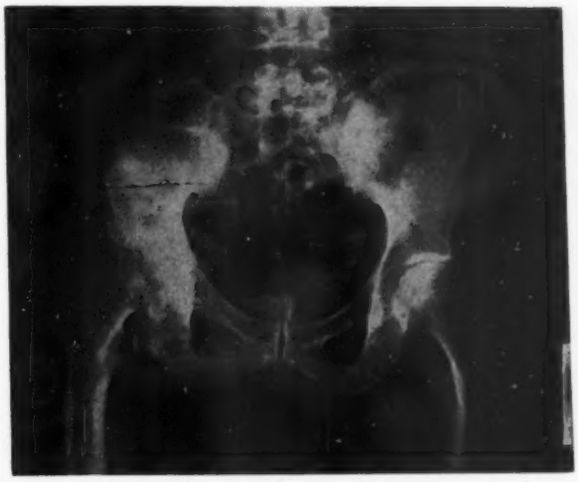

Fig. 9. Case v. Roentgenogram showing tumor of the right innominate bone. Patient had symptoms of one year's duration and had had two previous operations elsewhere for intervertebral disc.

in intensity. In another hospital in December, 1948, he had a laminectomy with a preoperative diagnosis of herniated intervertebral disc, and in January, 1949, he had a lumbar vertebral fusion. Following these two procedures his pain became worse and he was forced to use crutches in order to work. In the spring of 1949 a tantalum screw was removed at laminectomy. The patient failed to improve. Further x-ray studies showed a soft tissue mass eroding the right ilium. (Fig. 9.) The patient signed out of the hospital against advice. At the present admission the pain in the right lumbar region, hip and right lower extremity was still quite severe. Since the onset of his symptoms he had lost approximately 65 pounds.

On physical examination the patient appeared to be a somewhat emaciated, middle-aged man who was complaining of pain in the right hip region. Below the right anterior superior iliac spine and parallel with the inguinal ligament there was a healed scar overlying a firm, tender mass.

On July 21, 1949, a right hemipelvectomy was performed. Postoperatively the patient's strength gradually returned and he was able to be up and about on crutches. At the time of discharge the patient's mental attitude was good. The pathologist reported that the specimen contained chondrosarcoma. (Fig. 10.)

Following discharge from the hospital the patient was temporarily relieved of his pain. However, in the latter part of 1949 severe pain developed in the operative area which was not

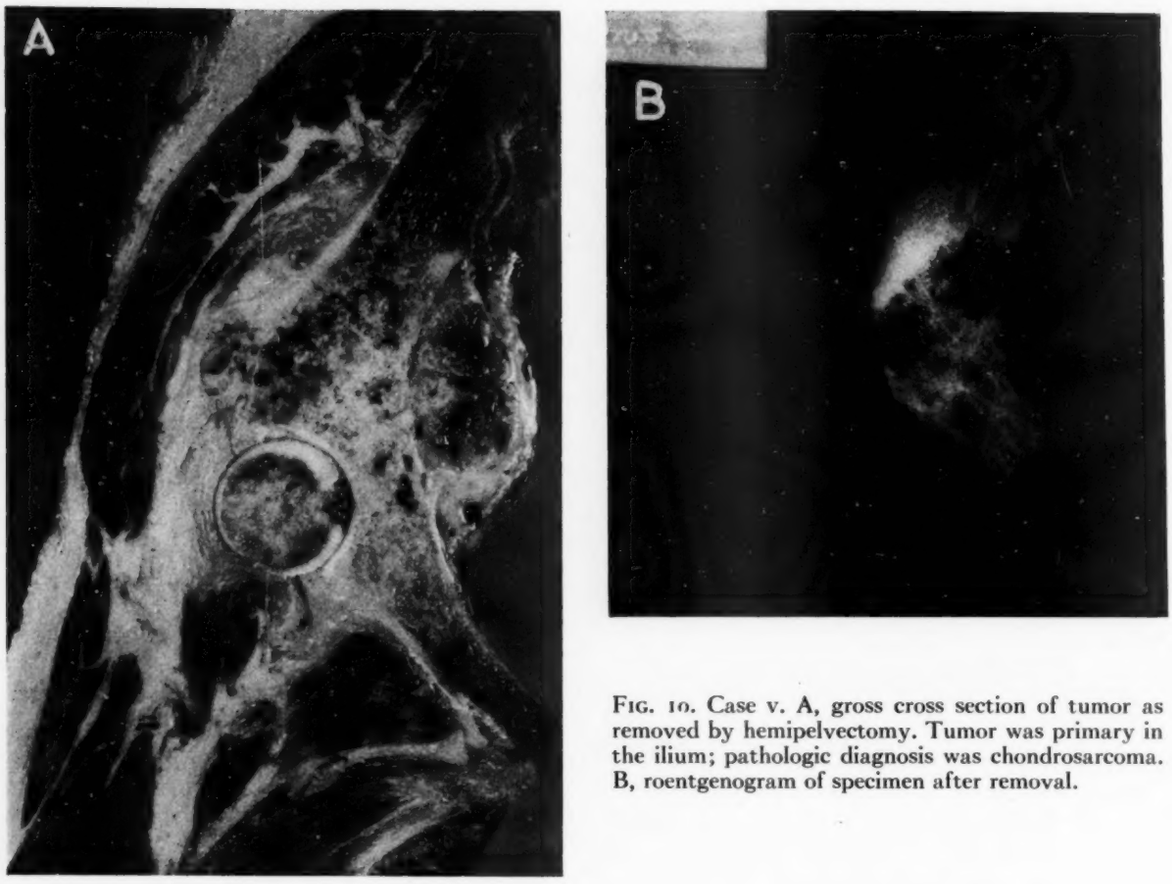

FIG. 10. Case v. A, gross cross section of tumor as removed by hemipelvectomy. Tumor was primary in the ilium; pathologic diagnosis was chondrosarcoma. B, roentgenogram of specimen after removal.

controllable with narcotics. The surgical scar was well healed except for a small draining sinus at the lower end. X-ray films of the lumbodorsal vertebrae and pelvis showed no evidence of local recurrence or distant metastases. (Fig. 11.) Since anesthetic and neuropsychiatric consultants believed that he had true causalgic pain which had progressed too far to be relieved by peripheral procedures, a prefrontal lobotomy was performed on February 10, 1950. Postoperatively the patient had intracranial hemorrhage and expired five days later. At autopsy the principal findings were intracranial hemorrhage following the prefrontal lobotomy and residual chondrosarcoma in the right iliac veins.

Comment. This patient had multiple operations before the correct diagnosis was established. At the autopsy approximately two years after the onset of symptoms chondrosarcoma was found only locally. Hence, this patient also might have had an excellent chance of cure if he had had a hemipelvectomy shortly after onset of symptoms.

HIP JOINT DISARTICULATION WITH OR WITHOUT DEEP ILIAC NODE DISSECTION

This procedure removes the entire lower extremity. The femur is disarticulated at its acetabular junction and all the thigh and leg muscles are removed. If an iliac node dissection is performed along with the disarticulation, the fatty tissue which is removed along the iliac vessels is left attached to the specimen. The first recorded surgical amputation at the hip joint was performed in 1824.[6] The operative mortality is not high. One author has reported twenty-five such disarticulations without an operative death.[7]

This procedure is indicated for tumors involving soft tissue or bone of the middle and upper thigh which cannot be completely removed by local excision or by the usual thigh amputation. It is also indicated in treatment of primary melanoma of the foot or leg which has metastasized to the groin lymph nodes. It is necessary that the neoplastic process does not extend to or through the hip joint in order for this procedure to be effective.

The patient is placed on the table with the thigh somewhat flexed and slightly abducted and externally rotated. The lower abdomen, opposite thigh, scrotum and the involved thigh should be prepared and draped. The scrotum is usually temporarily anchored to the opposite thigh. An anterior racquet incision is used, the upper portion of which extends about 2 inches above the mid-point of the inguinal ligament. The outer limit of the incision is carried over the greater trochanter, the medial limb is carried about 1 inch below the genitocrural fold, and these two limbs are joined posteriorly. Skin flaps are then developed. The inguinal ligament is freed. The femoral artery is dissected free and ligated above its profunda branch. Transection is then started through the muscle group. The adductor group of muscles is cut near their insertion. During the course of this part of the amputation the obturator vessels are interrupted and ligated. The anterior group of muscles is next transected. The extremity is adducted and the fascia lata is severed as well as the abductor muscles. At this point the lower extremity is elevated and the femoral vein is ligated at the same level that the artery was ligated. The capsule of the hip joint is exposed and opened. The head of the femur is disarticulated, and the sciatic nerve and posterior group of muscles are severed. After complete hemostasis the flaps are approximated with interrupted sutures.

If the procedure is to be combined with deep iliac node dissection, this dissection is usually carried out prior to the actual amputation. As soon as the flaps have been developed and the inguinal ligament has been cleared, the ligament is transected in the region of the femoral vessels. The floor of the inguinal canal is opened and the retroperitoneal space is approached. Fatty and lymph node–bearing tissue along the course of the iliac vessels and in the obturator area is removed from above downward and allowed to remain with the specimen. The actual amputation is then carried out as described heretofore.

Case Report

CASE VI. O. L. (No. 500927A), a thirty-seven year old white man, was admitted to the surgical service of the Ohio State University Hospital on February 11, 1950.

The patient stated that in 1942 a raised nodule between the second and third toes of the left foot was fulgurated. There was recurrence and in 1945 the same area was excised while he was in the military service. Again there was local recurrence and the lesion was again excised in 1948. At that time a diagnosis of non-pigmented malignant melanoma was made. He had no further difficulty with the local lesion; however, in December, 1949, an enlarged lymph node developed in the left inguinal region. At that time the node was excised and it was found that he had metastatic malignant melanoma to the inguinal area.

FIG. 11. Case v. Roentgenogram showing defect after hemipelvectomy for chondrosarcoma of ilium.

On examination the patient was well nourished and in no acute distress. There was no edema of the extremity. The area of the primary lesion on his foot showed no evidence of recurrence. He presented a scar in his left inguinal region which was well healed.

The usual preoperative investigation disclosed no evidence of distant metastases. His general condition was found to be good. Accordingly, on February 14, 1950, he was subjected to a left thigh disarticulation and a deep iliac node dissection. He tolerated the procedure very well.

The patient adjusted very well to his physical disability. He used crutches for about six months and at that time he obtained a prosthesis which he has been able to wear satisfactorily. He has been able to continue with his usual occupation of restaurant management.

To date, there has been no further evidence of disease.

REMARKS

Patients have to be convinced that surgical procedures such as these are necessary. They are willing to try every other possibility before they subject themselves to such deformity. The one factor that makes them decide more than any other is pain. It is remarkable that most patients will adjust readily to such deformities, and most of them will later express their satisfaction over the fact that the procedure was performed and that they have become free of pain.

It is unfortunate that quarter amputations as a rule are performed only on far advanced cases of cancer. End results have not been better following these operations because most of them have been done after a long time has elapsed and the tumor has had a chance to spread elsewhere. In each of the six cases described herein the disease was far advanced and the eventual outcome was not as good as if the amputations had been performed earlier.

Surgeons as a group show much hesitancy before advocating such surgery but their reaction is based on the results of far advanced cases. Surgeons as well as patients will have to be convinced of the value of these mutilating procedures, and they will be so convinced only by a high percentage of five-year survivals. To hope to obtain such percentages, these extensive procedures will have to be performed when the diagnosis is first made, and the diagnosis will have to be established early in the course of the cancer.

SUMMARY

1. Six cases of advanced cancer of the extremities are presented. Two patients were treated by hemipelvectomy, one by thigh disarticulation and groin dissection, and three by interscapulothoracic amputation. One of the latter patients had initially undergone scapulectomy.

2. The indications and technics of the various procedures are briefly described.

3. In this series of cases the results have been good as far as palliation is concerned even though the curative end results were low. In cases of advanced malignant disease it is justifiable to perform such radical operations for palliation; however, if a better cure rate is to be obtained, the procedures must be instituted early in the disease.

REFERENCES

1. Crosby, D. The first operation on record for the removal of the entire arm, scapula, and three-fourths of the clavicle. Concord, N. H., 1875.
2. Pack, G. T., McNeer, G. and Coley, B. L. Interscapulothoracic amputation for malignant tumor of the upper extremity. *Surg., Gynec. & Obst.*, 74: 161, 1942.
3. Pack, G. T., Ehrlich, H. E. and Gentil, F. Radical amputation of the extremities in the treatment of cancer. *Surg., Gynec. & Obst.*, 84: 1105, 1947.
4. Coley, B. L. Neoplasms of Bone. New York, 1949. Paul B. Hoeber, Inc.
5. Pack, G. T. and Ehrlich, H. E. Sacroiliac disarticulation (hemipelvectomy). *Ann. Surg.*, 124: 1, 1946.
6. Eckloff, N. L. An account of Sir Astley Cooper, first case of amputation at the hip joint, January 16, 1924. *Guy's Hosp. Rep.*, 89: 9–23, 1939.
7. Pack, G. T. and Ehrlich, H. E. Hip joint disarticulation (with and without deep iliac node dissection). *Ann. Surg.*, 123: 965, 1946.
8. Ariel, I. M. and Hark, F. W. Disarticulation of an innominate bone (hemipelvectomy) for primary and metastatic cancer. *Ann. Surg.*, 130: 76, 1949.
9. Sugarbaker, E. D. and Ackerman, L. V. Disarticulation of the innominate bone for malignant tumors of the pelvic parietes and upper thigh. *Surg., Gynec. & Obst.*, 81: 36, 1945.

CARCINOMA OF THE BREAST*

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THE purpose of this report was to make a critical study of carcinoma of the breast treated primarily with surgery by the writer. One hundred seventy-two operative cases were reviewed. In 146 of these it was possible to obtain follow-ups for a number of years. The remaining twenty-six were not included due to the impossibility of obtaining necessary accurate data. Throughout this review statistical studies of other clinics may be quoted in brief form but it is not the purpose of the writer to compare the statistics of others with his own. There has of late been such a variance in statistics that one is quite "at sea" in forming definite opinions regarding some of them.

The age incidence in the 172 cases is listed in Table 1. Of these patients 137 were married.

We know that cancer of the breast occupies such an important place in our profession, realizing that it averages from 20 to 25 per cent of all carcinomas in women, that it is incumbent upon all surgeons to evaluate their results. This should be done over a long period of time and an analysis made from all angles. No matter how small a series may be, surgeons should analyze their own cases and form judgment on their work.

We believe that the so-called "five-year cure" is a misnomer. It is misleading and in no way can guide us to any conclusions as to ultimate results. It must be borne in mind, indeed, that patients with untreated carcinoma of the breast have a life expectancy of about three years[2] and this is placing it very conservatively. How much better it would be if we were to follow a classification such as Finney[1] proposes of "arresting the disease" for such and such a time.

Factors arise in the course of the disease, many of which at least suggest inoperability so that a definite prognosis cannot be made, although of course we may be guided to a certain extent by the absence of axillary gland involvement, old age, lack of fixity to the chest wall, ulceration, the type of carcinoma and so forth. Time and time alone gives us a prospective as to the real mortality rate. We must, however, recognize the fact that the earlier the patient comes for treatment, the better the prognosis will usually be. Therefore the survival rate will naturally be higher from a statistical point of view and certainly higher when patients are selected for operation, as compared with the statistics covering a period of from thirty-five to forty years. In this space of time many patients came for delayed treatment, presenting ulceration, pigskin involvement, erosion of the ribs, fixity of the mass, breasts which were entirely involved in invasion, edema of the arm, fixity of the supraclavicular glands and freezing of the armpit nodes. These are the types of cases we used to see and occasionally do today. Undoubtedly technics have improved, more radical methods have been adopted by some, but we are confident that had Halsted selected his cases for operation, as is now being suggested by many, his mortality rate would have been much lower.

TABLE 1
AGE INCIDENCE

Age	No. of Cases
25–30	1
31–35	9
36–40	7
41–45	22
46–50	26
51–55	23
56–60	17
61–65	22
66–70	19
71–75	9
76–80	9
81–85	1
Unknown	7
Total	172

Should we consider the so-called "categorically inoperable carcinoma group" as really justified when cases may be technically of an inoperable nature? This question has given rise to much discussion and bears careful consideration. As Haagensen[3] very properly states, "Careful selection of cases is not an

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indication of timidity on the part of the modern surgeon, but rather an index of the extent of his knowledge of carcinoma of the breast." On the other hand, Wangensteen takes a much more radical attitude and in certain cases advises the most radical surgery,

TABLE II

All patients operated upon including those with no follow-up:	
Radical mastectomy	130
Semi-radical mastectomy	3
Simple mastectomy	39
	172
All patients operated upon including those with no follow-up:	
Radical mastectomy	110
Semi-radical mastectomy	3
Simple mastectomy	33
	146

far more radical than the conventional Halsted operation.[4]

In discussing the pros and cons of this categorically inoperable group we must believe that "It is wholly possible that certain criteria of inoperability may prove to be questionable and that were we to follow this concept dogmatically, many patients would not be given the chance, at least, of survival over varied periods." An analysis of this categorically inoperable group might be noted as follows:

Extensive Edema of the Skin over the Breast. This factor must be considered as of very serious import and should be looked upon as falling into this group.

Inflammatory Type of Carcinoma. We all admit, I believe, that this type of tumor, in which it extends over a large area which can be interpreted in terms of carcinomatous emboli in the subdermal lymphatics, is not remedied by conservative or radical surgery. I must admit that some years ago I performed simple mastectomy on four patients and semi-radical mastectomy on one. At that time it was quite customary to operate upon this type of patient. A forty-six year old woman survived one year and died of pulmonary involvement. Another forty-six year old woman survived three years and died of general carcinosis. One patient seventy-six years of age survived one year and died of general carcinosis. A fourth patient, seventy years of age, died in three years from skeletal and general carcinosis. In this group of four I do not believe that even the patient who survived three years was in any way benefited by surgery. Had we known more about deep and hormone therapy at that time, none would have been subjected to surgery and indeed their span of life might possibly have been increased by non-operative measures.

Solid Fixation of Breast to Thoracic Wall. Simple mastectomy was performed in four cases and radical mastectomy in two. No patient lived over two years. Certainly deep and hormone therapy are indicated in this type but operation had been performed long before we were cognizant of that type of treatment. This type of case is to be placed in the inoperable group unless there is a fetid mass repugnant to the patient; then simple mastectomy may be justified.

Carcinoma Developing during Pregnancy and Lactation. Malignancy in this group is extreme and the prognosis is not good. On the other hand, even those who have called this group inoperable are beginning to take a more favorable view and are rather loathe now to look upon all such cases as being inoperable. Strange as it may seem, the longest living survival in our series is a woman who is still living very happily with no evidence of metastasis and who is perfectly well following a radical mastectomy performed thirty-five years previously. This same coincidence was observed by Tomlinson and Eckert.[4] Let us still operate on this group unless extenuating circumstances exist. Do not place this type of case in the categorically inoperable group.

Satellite Nodules in the Skin over the Breast. This type is not amenable to surgery. Deep or hormone therapy or both are indicated.

Intercostal or Parasternal Metastasis. It is the general consensus of opinion that this group is inoperable although Wangensteen is adamant on the subject and believes that very radical surgery is advisable.

Edema of the Arm. This should be looked upon as categorically inoperable from the standpoint of at least the breast.

Proved Supraclavicular Metastasis. When the nodes are absolutely frozen and fixed, deep or hormone therapy or both are indicated. However, when freely movable nodes are present, even though they have proved to be carcinomatous in nature, it is my opinion that radical surgery should be employed.

TABLE III

SIMPLE MASTECTOMY (THIRTY-THREE CASES)*

SURVIVAL, FIVE YEARS OR MORE

Age	Type	Axillary Involvement	Ulceration	Involvement	Time (yr.)	Result
42	Scirrhous	o	o	Single	8	Living and well
59	Ductal	++	o	Bilateral	6	Living and well
61	Ductal	+	o	Far advanced	5	Living and well
66	Scirrhous	+	+	Far advanced	5	Death, skeletal involvement
69	Adenocarcinoma	o	o	Single	13	Living and well
70	Ductal	o	o	Single	10	Living and well
72	Scirrhous	o	o	Single	12	Death, abdominal metastasis
74	Carcinoma	o	o	Single	5	Living and well
80	Scirrhous	++	++	Entire breast	6	Death, cardiorenal involvement
85	Simple	+	+	Entire breast	5	Living and well

* No recurrence 5 yr. or more—24.2%
Recurrence 5 yr. or more — 6.2%
Living 5 yr. or more..... 30.3%
Dead within 5 yr..... 69.7%
Of those dead within 5 yr. 3 died of "other causes."

TABLE IV

SIMPLE MASTECTOMY—DIED WITHIN FIVE YEARS

Age	Type	Axillary Involvement	Ulceration	Involvement	Time	Cause
65	Scirrhous	+	o	Single	1 mo.	Coronary
69	Medullary	+	o	Almost entire breast	3 mo.	General
72	Scirrhous	+	o	Single	5 mo.	General
42	Medullary	+	o	Entire breast	8 mo.	Abdominal
76	Colloid	+	+	Entire breast	1 yr.	General
76	Medullary	+	+	Almost entire breast	1 yr.	General
43	Scirrhous	+	o	Almost entire breast	1 yr.	Pulmonary
76	Scirrhous	+	o	Single	1 yr.	Coronary
46	Colloid	+	+	Almost entire breast	1 yr.	Pulmonary
46	Carcinoma	+	o	Almost entire breast	1 yr.	General
61	Scirrhous	+	o	Far advanced	1 yr.	Pulmonary
59	Medullary	+	o	Far advanced	1 yr.	General
76	Scirrhous	+	o	Far advanced	1 yr.	General
42	Scirrhous	+	+	Pigskin	2 yr.	General
66	Scirrhous	+	o	Almost entire breast	2 yr.	Skeletal
55	Scirrhous	o	o	Toxic goiter	2 yr.	Pulmonary
53	Scirrhous	+	o	Far advanced	2 yr.	Skeletal
45	Colloid	+	o	Entire breast	2 yr.	General
46	Colloid	+	+	Entire breast	3 yr.	General
75	Scirrhous	o	o	Single	3 yr.	General
64	Ductal	o	o	Single	4 yr.	Carcinoma of uterus
68	Scirrhous	+	o	Cardiorenal	4 yr.	Skeletal
70	Colloid	+	+	Pigskin	3 yr.	Skeletal
		Axillary involvement—86.9%		Ulceration—26%		

TABLE V

SIMPLE MASTECTOMY, 33 CASES

Manifestations	
Ulceration	8
Ulceration with pigskin	2
Far advanced without ulceration	10
Single, small	10
Toxic goiter	1
Cardiorenal	2
Axillary involvement	26
No axillary involvement	7
Types	
Scirrhous	13
Adenocarcinoma	3
Ductal	4
Colloid (inflammatory)	4
Simplex	4
Medullary	1
Carcinoma	1
Unknown	3

TABLE VI

RADICAL MASTECTOMY, WITHOUT RECURRENCE FIVE YEARS OR MORE

Age	Type	Axillary Involvement	Time (yr.)
46	Scirrhous	0	5
39	Medullary	+	5
60	Carcinoma	0	5
65	Scirrhous	+	5
77	Medullary	0	6
62	Scirrhous	+	6
52	Scirrhous	0	6
33	Carcinoma	0	6
65	Carcinoma	+	8
60	Scirrhous	0	8
63	Medullary	+	9
65	Medullary	+	11
61	Adenocarcinoma	0	11
53	Ductal	0	12
49	Adenocarcinoma	+	12
43	Scirrhous	0	13
62	Papillary	0	14
41	Ductal	0	8
45	Scirrhous	0	14
50	Medullary	+	14
31	Carcinoma	+	15
42	Scirrhous	0	16
33	Scirrhous	0	17
56	Adenocarcinoma	+	18
44	Scirrhous	0	18
60	Carcinoma	0	18
44	Scirrhous	0	20
49	Carcinoma	0	21
45	Medullary	0	21
60	Scirrhous	+	24
59	Carcinoma	+	23
50	Scirrhous	0	24
45	Carcinoma	+	25
34	Medullary	0	34

No axillary involvement—58.8%

Distant Metastasis. Certainly there is no argument in this group.

In reviewing the 146 operative cases it should be noted that radical mastectomy was performed in 110 cases, semi-radical mastectomy in three and simple mastectomy in 33. Thirty-three patients operated upon by simple mastectomy appears on the surface to be a great number as compared with the radical operation. It should, however, be borne in mind that over a thirty-six-year period of

TABLE VII

RADICAL MASTECTOMY, RECURRENCE FIVE YEARS OR MORE

Age	Time (yr.)	Axillary Involvement	Cause of Death	Type
38	6	+	Lung metastasis	Ductal
41	6	+	Lung metastasis	Carcinoma
43	15	+	Abdominal metastasis	Carcinoma
44	5	+	Skeletal	Scirrhous
45	10	+	Stomach skeletal	Medullary
45	11	+	Lung-brain	Scirrhous
46	6	+	Generalized	Carcinoma
62	9	0	Neck-shoulder	Carcinoma
63	7	+	Lungs	Carcinoma
64	5	0	Carcinoma of uterus	Carcinoma
65	10	0	Stomach	Carcinoma
66	5	+	Skeletal	Scirrhous
75	10	+	Generalized	Adenocarcinoma

TABLE VIII

AXILLARY INVOLVEMENT

Radical Mastectomy	
No recurrence 5 yr. or more; no axillary involvement	58.8%
No recurrence 5 yr. or more; axillary involvement	41.2%
With recurrence 5 yr. or more; no axillary involvement	23.0%
With recurrence 5 yr. or more; with axillary involvement	76.9%
Died within 5 yr.; with axillary involvement	97.5%
Simple Mastectomy	
5 yr. or more, without axillary involvement clinically	40.0%
5 yr. or more, with axillary involvement	60.0%
Died within 5 yr., with axillary involvement	91.3%
Died within 5 yr., without axillary involvement clinically	8.6%
Simple mastectomy, living and well 5 yr. or more, no axillary involvement	37.5%
Simple mastectomy, living and well 5 yr. or more, with axillary involvement	62.5%

Semi-radical mastectomy, all died within 5 yr.

TABLE IX
SURVIVAL PERIOD IN CARCINOMA OF BREAST
(146 OPERATIVE CASES)

Radical mastectomy	
Living 5 yr. or more	52.7%
Died within 5 yr	47.3%
Semi-radical mastectomy	
Died within 5 yr	100.0%
Simple mastectomy	
Living 5 yr. or more	30.3%
Died within 5 yr	69.7%
Survived 5 yr. or more	46.5%
Died within 5 yr.*	53.5%

* Of those who died within 5 yr., 11 died of causes unrelated to carcinoma; lowering the mortality to 32.1%. Of course we do not know how many of these would have subsequently died of carcinoma.

TABLE X
SURVIVAL FIVE YEARS OR MORE

Died of Causes Unrelated to Carcinoma of the Breast

Operation	Age	Time (yr.)	Cause of Death
Simple	85	5	Senility
Radical	65	5	Acute diverticulitis with perforation
Radical	63	6	Coronary
Radical	65	8	Carcinoma of uterus (?)
Radical	53	12	Myocardial failure with decompensation
Radical	33	8	Suicide, no record
Radical	46	15	Acute cardiac dilatation
Radical	49	16	Myocardial insufficiency
Radical	70	21	Diabetes-cardiac
Radical	66	21	Senility
Radical	45	25	Lobar pneumonia

Died of Carcinoma, Probably Related to the Breast

Pulmonary	Stomach	Skeletal	General
5	10	5	12
6	10	5	12
6		5	25
11		12	

TABLE XI
MORTALITY SUMMATIONS HAD CASES BEEN SELECTED AS "CATEGORICALLY INOPERABLE"

	No. of Cases	Mortality Rate %
Simple mastectomy		
Including all patients operated upon	33	69.7
Excluding those categorically inoperable	10	30.3
Semi-radical mastectomy		
Including all patients operated upon	3	100
Excluding those categorically inoperable	3	100
Radical mastectomy		
Including all patients operated upon	110	57.2
Excluding those categorically inoperable	11	47.2

TABLE XII
SURVIVAL TIME IN 146 CASES

No. of Cases	Years of Survival
17	5
5	6
3	7
4	8
3	9
4	10
3	11
6	12
2	13
2	14
3	15
3	16
1	17
3	18
2	20
2	21
1	23
2	24
2	25
1	35

operating many patients came for surgery in a very far advanced stage of the disease and at a time when practically all patients with carcinoma of the breast were operated upon, not considering the categorically inoperable group which has quite recently been introduced in the study of this condition. An analysis of these cases has been thoroughly gone into both from the viewpoint of the writer's conscience for and against his rationa in having performed so many simple mastectomies and, also, to acquaint himself as to whether or not the simple operation was justified considering the type of patients who underwent operation. (Tables 11 to v.)

In this series of thirty-three cases the following manifestations were noted: ulceration with far advanced lesion, eight; ulceration with pigskin development, two; very far advanced without ulceration, ten; toxic goiter, one; cardiorenal severe, two. The aforementioned included four patients with colloid or inflammatory type of carcinoma. Twenty-six showed

very extensive axillary involvement, with some presenting fixity to the chest wall and a so-called "frozen axilla." Sixteen of the patients were over sixty-five years of age and twelve were over seventy years old. (Tables VI to XII.)

SUMMARY

Of the 110 patients operated upon using radical mastectomy, 52.7 per cent had arrest of the disease five years or more.

Of the thirty-three patients operated upon using simple mastectomy, 30.3 per cent had arrest of the disease for a period of five years or more (including all types of cases, many of which are now considered categorically inoperable).

Radical mastectomy, if at all feasible, is in the present state of our knowledge absolutely necessary, for we must remember that the disease may be more active in the glands than in the breast itself. On the other hand, if radical mastectomy cannot be considered, simple mastectomy "may give material comfort to the patient to say nothing of the psychic effect in knowing that the primary tumor has been disposed of and it is possible too, that it may have a favorable influence on the ultimate result." However, in the present state of our knowledge we must recognize the fact that on the whole simple mastectomy should be considered only in very selected cases in which a fetid, rotten mass is present that must be disposed of, not from the standpoint of cure or of even arresting the disease but from the viewpoint of comfort to the patient and increasing the morale. In the vast majority of those cases in which a simple mastectomy might heretofore have been considered we now turn to deep and hormone therapy, which certainly under ordinary conditions will tend at least to arrest the disease in a great many individuals.

However, in perusing the records of the cases included in this report we cannot help but wonder, at least, whether or not in those very cases of advanced disease the mortality rate might have been almost or even as great had radical excision been employed. This, of course, is an academic question and we must consider radical excision as being indicated in practically all cases not amenable to deep or hormone therapy (with few exceptions).

REFERENCES

1. FINNEY, G. Discussion, *Ann. Surg.*, 132: 833–843, 1950.
2. KING, W. G. Treatment of far advanced carcinoma of breast, *Arch. Surg.*, 61: 630–653, 1950.
3. HAAGENSEN, C. D. Carcinoma of breast. Monograph, American Cancer Society, pp. 1–120, 1950.
4. TOMLINSON, W. L. and ECKERT, C. T. "Categorically inoperable" carcinoma of the breast. *Ann. Surg.*, 130: 38–42, 1949.
5. BERVEN, E. Treatment and results in cancer of the breast, *Am. J. Roentgenol.*, 62: 320–325, 1949.
6. TAYLOR, G. W. and WALLACE, R. H., Carcinoma of the breast. *Ann. Surg.*, 132: 833–843, 1950.
7. RIDDELL, V. Early diagnosis and treatment of carcinoma of the breast, *Brit. M. J.*, 2: 635–739, 1948.
8. CADE, S. Carcinoma of the breast. *Am. J. Roentgenol.*, 62: 326–327, 1949.

CARCINOMA OF THE PENIS*

EVALUATION OF RECURRENCE FOLLOWING LIMITED SURGERY AND PRESENTATION OF AN EXTENDED SURGICAL ATTACK

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IN 1948 Hudson, Cason and Scott recommended consideration of surgical therapy more extended in scope of dissection than the classical Hugh Young procedure for cure of carcinoma of the penis.[1,2] Pursuit of this idea has been prompted by a knowledge of lymphatic, embolic dissemination of penile cancer from an initial, local point of departure into aberrant growth, to the regional lymph glands.

In this communication a modified, extended operation which has been found technically reasonable will be described. The rationale for resorting to this type of surgery for cancer of the penis will be delineated. For emphasis in this regard the case histories of thirty consecutive cases of penile cancer treated at the Squier Urological Clinic and the Division of Genito-urinary Surgery of the Francis Delafield Hospital will be reviewed briefly. An attempt will be made to give convincing evidence that currently popular means of control of cancer of the penis are inadequate.

In order to establish the inadequacy of any method of cancer therapy it is necessary to cite only a high incidence of cancer recurrence following what is believed to be curative surgery. We will describe an opportunity to improve upon the various therapeutic systems which have been employed in this Institution for the control of penile cancer.

We have reviewed the recurrence rate of carcinoma of the penis following therapy in this medical center. Five-year survival incidence will not be considered here. It seems logical to assume that epithelioma occurring anywhere in the body is usually curable provided the initial therapy is adequate. Reliance upon anticipatory interception of regional metastases subsequent to a limited, original operation—with or without concomitant radiotherapy—appears, in our thirty consecutive penile cancer patients, to be a regimen fraught with disaster in the form of recurrent, lethal cancer. Such recurrences are often impossible to retrieve surgically.

Microscopic Pathology. For practical purposes of description, all thirty tumors were found to be squamous cell carcinoma. In the main, they have appeared to be mostly grade I and II malignancies (Broders). A great variation in the degree of anaplasia of cells within a single primary growth has been noted, as well as variations between the cytology of the primary and the metastatic lesions. This picture of the pathology of cancer of the penis closely approximates the recorded observations of others.

Pathogenesis and Clinical Appraisal. The original concept of Young concerning the dissemination of the cancer from its site of origin has stood the test of time. Involvement of femoral and inguinal lymph glands is present in at least half the patients at the time of first examination. The presence of metastases in these regional glands cannot be correlated with the examining physician's impression obtained by palpation.

At considerable risk of insulting those who see penile cancer in its earliest stages of growth, it must be emphasized that dependable diagnosis without biopsy is impossible.

Although there is general agreement that the disease spreads first to the femoral and inguinal lymph glands, the possibility of "recurrence" within the iliac and preaortic nodes is usually overlooked until too late. Furthermore, the

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instances in which tumor is found within *lymphatic channels* occur with sufficient frequency to account for a good many deaths from this tumor when *en bloc* technic is not employed. Whether such pelvic glandular lesions appear as a result of passage of cells from the penis directly through the perineum, or whether the progression is via the inguinal and femoral glands, is conjectural and from the standpoint of therapy unimportant.

TABLE I

PATIENTS WITH CLINICAL DIAGNOSIS OF INGUINAL, METASTATIC LYMPHADENOPATHY

Number of cases	15
Patients subjected to inguinal node dissection	11
Metastases demonstrated in nodes by microscopy	5
No follow-up	2
No recurrence	1
Dead of recurrent tumor	1
Short follow-up at present	1
Metastases not demonstrated by microscopy	6
No follow-up	1
No recurrence	4
Dead of recurrent disease	1
Patients not subjected to inguinal node dissection	4
Dead of recurrent tumor	3
Dead, other causes	1

Results of Therapy. Of the thirty patients, fifteen were considered to have inguinal lymphadenopathy prior to the beginning of treatment. Eleven patients of this group were subjected to lymph node dissection and four were not. Of the latter group all have died, three as a direct result of cancer and one of intercurrent disease. By random section alone almost 50 per cent of the eleven specimens (removed during inguinal dissection in the others of the preoperative "lymphadenopathy" group) contained cancer. Recurrent cancer has developed postoperatively in one patient in this category. An additional patient whose removed lymph nodes were negative for tumor has died of cancer. In other words, of the "clinically metastatic" patients one-third of the total number have suffered recurrence. If the patients who cannot be evaluated are excluded, the percentage of recurrence becomes 50 per cent (Table I.)

In this over-all study group fifteen patients were thought to have no preoperative regional lymphadenopathy. Only two of these were given the benefit of inguinal node dissection, and in one, metastasis was demonstrated in the excised nodes. Only eight of the thirteen patients with negative node palpation diagnoses have been followed up. Of these eight, five have suffered recurrence—a cancer recurrence rate of over 62 per cent in this group who were all initially thought to have lesions confined to the penis. (Table II.)

Comment. From these data it is clear that arbitrary regional (inguinal) node dissections decrease the incidence of recurrent cancer. It appears further that inguinal node dissections are not sufficient warranty of complete excision of neoplastic tissue and that an extended operation might result in fewer recurrences. In this last regard the technic currently employed in the Division of Urology, Francis Delafield Hospital, will be presented in some detail.

TABLE II

PATIENTS WITH CLINICAL DIAGNOSIS OF TUMOR CONFINED TO PENIS

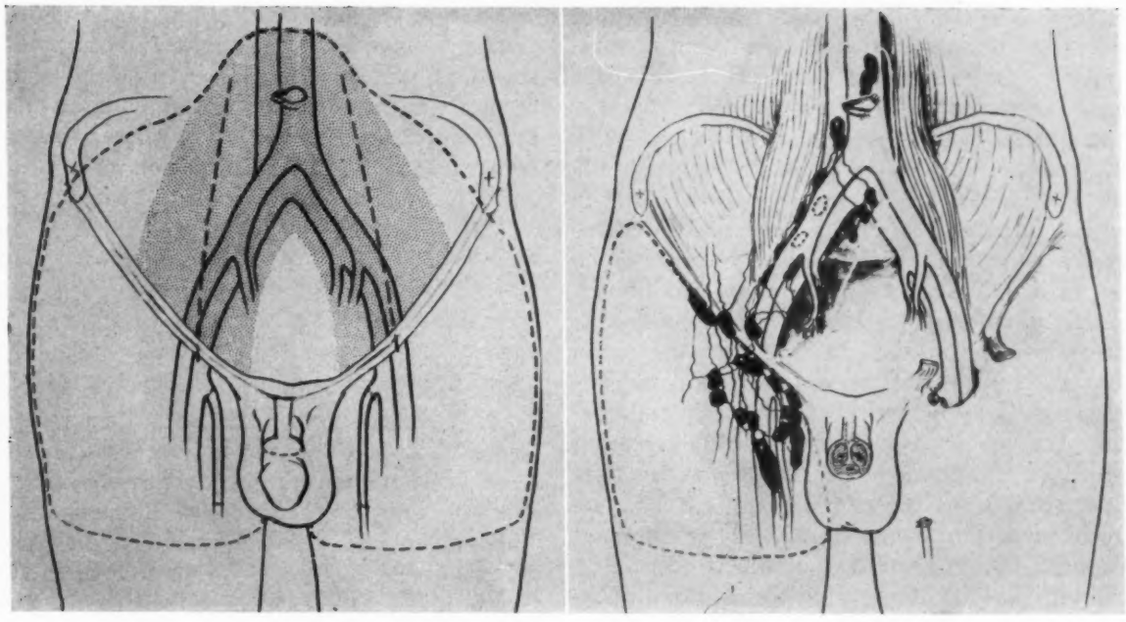
Number of Cases	15
Patients subjected to inguinal node dissection	2
Metastases demonstrated in nodes by microscopy	1
No recurrence in 3 yr	1
Metastases not demonstrated by microscopy	1
No recurrence in 10 yr	1
Patients not subjected to inguinal node dissection	13
No follow-up	5
No nodal recurrence in 5 yr	1
Known nodal recurrence	4*
Dead of recurrent tumor	1
Dead, other causes	2

*All of these patients are now beyond surgical treatment.

TECHNIC OF EXTENDED OPERATION

Our present area of excision includes *en bloc* the following structures: (1) the penis, amputated 3 cm. proximal to the gross edge of the primary lesion (frozen section to confirm amputation in a tumor-free area); (2) the dorsal skin, lymphatics and subcutaneous tissue of the penis, 2 cm. in width; (3) the subcutaneous fat, fascia and lymphatics, as deep as the anterior abdominal fascial sheath, from the level of the umbilicus to a point 5 cm. below the saphenofemoral venous junction on each thigh; this dissection extends laterally just beyond the anterior superior iliac spines on either side; (4) the inguinal, femoral, iliac and preaortic lymph glands, areolar tissue, lymphatics and fat.

Surgical dissection is begun with an incision barely through the skin in the lower anterior abdominal area. (Figs. 1 to 3.) This transverse incision extends from one anterior superior iliac spine to the other, with a gentle convexity toward the symphysis pubis. The superior and inferior skin flaps are undermined



1 2

FIG. 1. The extent of superficial fat and lymph node excision is shown by the outer broken line on the lower abdomen and thighs. The shaded area indicates the extent of the iliac and pre-aortic lymph node dissection (extra-peritoneally). The broken lines on either side of the great vessels mark the direction and extent of division of the abdominal musculature after the inguinal ligaments are divided.

FIG. 2. Unilateral (left) dissection is complete. Note the partially amputated penis, excised dorsal lymphatics and divided left inguinal ligament. A segment of left saphenous vein has been removed with the specimen along with the left inguinal, femoral and iliac nodes. A similar dissection is next performed on the right side, removing the remaining lymph glands shown here.

quite close to the skin itself. When the superior flap has been undermined upward as far as the umbilicus, the dissection is deepened transversely to the anterior rectus and external oblique fasciae. Downward clearing of this mass of tissue is begun, leaving the muscle sheaths clean. Laterally, the dissection is continued downward just outside the iliac spines and onto the fascia lata of each thigh, which marks the depth of dissection in this area. The lower limit of surgery is a transverse line across the anterior surface of the thigh about 5 cm. below the foremen ovale. As this line is deepened medially, the saphenous vein and its branches are picked up, divided and ligated. This segment of the vein, removed with the specimen, serves as a guide to the foramen ovale where the vein is ligated and divided as it enters the femoral vein. The mass on either side is elevated from the femoral vessels; femoral and inguinal lymph glands are never at any time exposed or excised singly. The femoral canal is laid open. The abdominal muscles are severed in a line parallel to the iliac

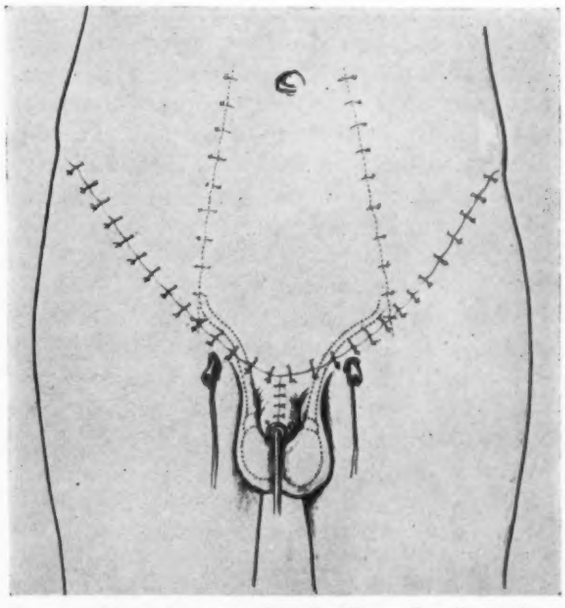


FIG. 3. Operation completed. Note the dependent position of the Penrose drains, the reconstructed penis and the closure of abdominal wall and skin incisions. (The latter are indicated by the vertical broken lines.)

vessels, and the lymphatic chain, fat and areolar tissue are removed to a point several centimeters above the bifurcation of aorta and vena cava. The abdominal muscular incisions and femoral canals are closed with interrupted sutures and the dissection is renewed in the subrapubic region. When the superficial mass of fat has been peeled downward in the midline over the symphysis, the suspensory ligament of the penis is divided. Next, in continuity with the main mass of tissue, parallel incisions 2 cm. apart are made on the dorsum of the penis. These are continued to the point selected for penile amputation. Amputation is performed with a proximal tourniquet. Bleeding is controlled with interrupted mattress sutures of chromic catgut. The urethra is left 1.0 cm. longer than the proximal corpora. A thin section of tissue is submitted for immediate frozen section to insure amputation within an area free of cancer.

Plastic repair of penile skin is effected. An indwelling Foley bag catheter is utilized in the urethra. The skin flaps are reapproximated with interrupted fine silk sutures. A small Penrose drain is left in a stab incision in each lower skin flap for dependent drainage, and a pressure dressing is applied.

RADIOTHERAPY

Some form of local or regional lymph gland radiation has been utilized in treating eleven of the carcinomas reviewed here. This therapy has been used only as an adjunct to surgery, not as a definitive form of therapy. There has been no detectable alteration in spread of the tumor or the rapidity of growth.

At least one-half of all malignant tumors of the penis have produced regional metastases at the time of initial appraisal. In addition, it is recognized that epitheliomatous lymph gland lesions are radioresistant. For these reasons it seems logical to discard radiation as a form of curative therapy for carcinoma of the penis.

SUMMARY

The rate of tumor recurrence following surgery limited to the inguinal glands and primary penile carcinoma is high.

Staged surgery or regimens other than *en bloc* excision do not appear justifiable upon a basis of the known morbid anatomy. Radiotherapy is not useful as a curative measure.

An extended operation based upon pathogenesis of the tumor has been utilized, and appears to be a rational form of therapy.

This communication should not be interpreted as adverse and idle criticism of the fact that extended surgery such as the operation described here was not adopted many years ago. Without blood banks, antibiotics and modern reconstructive technics such procedures cannot safely be undertaken. Final evaluation of this operation must await demonstration of a high incidence of five-year cancer-free survival cases.

REFERENCES

1. Hudson, P. B., Cason, J. P. and Scott, W. W. The value of radical operation for carcinoma of the penis. *South. M. J.*, 41: 761–765, 1948.
2. Young, H. H. A radical operation for the cure of cancer of the penis. *J. Urol.*, 26: 285, 1931.

MANAGEMENT OF BENIGN LESIONS OF THE LOWER BOWEL

A NEW TECHNIC UTILIZING THE ELECTROTOME

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THE management of certain bowel lesions occurring below the peritoneal reflection, by the use of fulguration and loop resection, has long been an accepted procedure and has in the hands of most individuals given reasonably satisfactory results.

After observing the precision with which the genitourinary surgeons have utilized the modern electrotome in the management of vesical neck and intravesical lesions, it has seemed logical to apply a similar technic to the management of such lesions of the lower bowel. It was hoped thereby to achieve greater control and an increased degree of accuracy in the depth to which tissue removal was accomplished. It is the purpose of this paper to outline early experiences with this work as well as to note its pitfalls.

This procedure was used in a sixty-five year old man in whom during the course of routine examination for unrelated rectal complaints a lesion measuring 1 cm. in diameter was found 14 cm. from the anal line. Biopsy at the time of removal revealed an adenomatous polyp with early papillary carcinoma. Although this was not the first case in which the procedure was used, it did illustrate the advantages and problems and is therefore related in more detail. At the time of surgery the McCarthy electrotome was passed and the area locally distended with a continuous flow of irrigating fluid. This gave a remarkably clear and accurate visualization of the entire lesion and the adjacent bowel wall. Only a few minutes were required to resect the lesion completely, accurately delineating its base and demonstrating its resection into the bowel wall proper. One major vessel was encountered in the pedicle but its accurate control was not difficult with the underwater vision afforded by this technic.

It was noted that the bowel lesion cut with appreciably less resistance than the usual vesical neck lesion and more nearly approximated that of the papillary intravesical growths in this respect.

The relatively thin bowel wall likewise gave no additional leeway for protection from unnecessarily deep bites of tissue. This was regarded with care. It was conceivable that a bowel wall cut too thin or with too heavy a current might easily perforate from any increased intraluminal pressure, either immediately or secondarily. For the same reason care was utilized to avoid overdistention of the local bowel loop.

It was found technically easier to use the McCarthy electrotome in the removal of a locally recurrent sessile-based adenocarcinoma arising in an adenomatous polyp. This patient was an eighty-four year old man in whom the diagnosis was made four years before. He had had three previous fulguration procedures followed by recurrence in each instance. This man consistently refused to have a proper resection completed although it was strongly urged from the time the diagnosis was established. When seen at this time he presented a 1.5 by 1.0 by 0.6 cm. recurrent nodule 12 cm. above the anal line and on the posterior wall. The actual resection which represented the first application of the procedure was done April 2, 1952, and presented no major problems except as outlined heretofore. When completed a smooth, dry, slightly depressed base was evident which grossly in no way differed from the anticipated bowel wall. Bleeding was practically non-existent.

In each instance the postoperative course was uneventful. In the first a maximum temperature elevation of 99°F. was encountered with a complaint of very mild lower abdominal "soreness." No other symptoms or findings of consequence were encountered.

Bowel evacuation was encouraged by the use of mineral oil postoperatively and presented no problems.

The healing of these lesions as noted in the

postoperative follow-up was almost phenomenal. The mucosal surfaces presented smooth, even contours with excellent elasticity and minimal scarring and fixation. To date there has been no evidence of neoplastic recurrence although the follow-up time is very inadequate. In the one case cure is anticipated but in the other recurrence is likely.

SUMMARY

The advantages of the use of the electrotome for resection of lower rectal lesions have been predicated by virtue of its usage and adaptability in the genitourinary field.

Examples of this extended field of usage are described.

Caution is urged to avoid cutting or coagulating beyond the depth of the bowel wall. Increased intraluminal pressure must be avoided. The injudicious use of this procedure above the peritoneal reflection is not advised.

Those tumors of blood or lymph vessel origin as well as those of endometrial origin will not lend themselves to this technic.

REFERENCES

1. Cantor, A. J. Ambulatory Proctology, pp. 437–471. New York, 1952. Paul B. Hoeber, Inc.
2. Pack, G. T. The indications for conservative rectal resection. *Rev. Gastroenterol.*, 19: 445–453, 1952.

Superficial vein ligation is mostly insufficient for varicosities of the lower limbs, not only because of recurrences but also because otherwise a fatal pulmonary embolism may eventually ensue, especially if phlebitis was also present. It is no wonder, therefore, that surgeons are also excising or "stripping out" these varicosities. (*Richard A. Leonardo, M.D.*)

MALIGNANT TUMORS ORIGINATING IN MECKEL'S DIVERTICULUM*

CASE REPORT OF A LEIOMYOSARCOMA AND REVIEW OF THE LITERATURE

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THE alimentary pouch known as Meckel's diverticulum was first mentioned by Hildanus in 1598 and was later described by Ruysch in 1701 and Lavater in 1772. Meckel described the diverticulum, which has come to bear his name, in 1812.[10]

The diverticulum is a vestigial organ representing a remnant of the omphalomesenteric duct and is found in about 2 per cent of the population.[2] At about the fifth week of fetal life the omphalomesenteric duct, which connects the alimentary canal with the yolk sac, becomes obliterated. If the normal obliterative process is imperfect, one of four anomalies may result. The duct may remain entirely patent with an intestinal fistula and discharge of ileal content through the umbilicus. If the duct remains patent in its distal portion, an umbilical fistula may persist with secretion by the lining membrane. If the duct closes at its proximal and distal portions but remains patent at its central area, a retention cyst or true enterocystoma forms. If only the distal portion of the duct becomes obliterated, a true Meckel's diverticulum results.[1,3]

The diverticulum is generally located on the antimesenteric border of the ileum between 30 and 90 cm. from the ileocecal junction. It varies considerably in both size and shape, and so-called "giant" forms have been reported.

There is general agreement that the lesion causes clinical disease in 15 to 20 per cent of the people in whom the organ is found. Meckel's diverticulum is subject to various types of pathologic conditions including acute inflammation, intussusception, perforation, volvulus and peptic ulceration. The organ may also be a component of a hernia. Peptic ulceration is usually associated with heterotopic gastric mucosa. Other heterotopic tissues which have been reported in Meckel's diverticulum are pancreatic tissue and biliary, duodenal and jejunal mucosa.[14] The incidence of heterotopic tissue has been reported as 34.9 per cent in a total of 1,044 cases.

Neoplastic changes have been described as occurring in Meckel's diverticulum and include myoma, lipoma, neuroma, papilloma and argentaffin tumors among the benign growths, and carcinoma and sarcoma in the malignant group.[4–8,9,12,15]

Malignant neoplasms originating in Meckel's diverticulum are so rare as to be considered surgical and pathologic curiosities.[13]

Nygaard and Walters[11] in 1937, in an extensive review of this subject, collected six cases of carcinoma and fourteen cases of sarcoma. The authors have uncovered three additional cases of carcinoma and four of sarcoma, and report one of their own. (Tables I and II.)

CASE REPORT

G. M., a seventy-six year old white man, was admitted to Nassau Hospital on July 18, 1951, with crampy generalized abdominal pains, obstipation and vomiting of seventy-two hours' duration. The pains began in the epigastrium but soon became generalized. Positive physical findings were related solely to the abdomen which was moderately distended, tympanitic, silent to auscultation and diffusely tender.

Important past history was a similar episode in September, 1950, requiring hospitalization. At that time the patient had small bowel obstruction thought to be due to a right inguinal hernia. With Miller-Abbott intubation and reduction of the hernia, the patient rapidly improved and was discharged without operation.

Shortly after the present admission a flat x-ray of the abdomen was taken. The report follows: "Examination of the abdomen shows several markedly distended loops of small bowel. There is little, if any, gas in the colon.

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The findings suggest a small intestinal obstruction fairly high up."

A Miller-Abbott tube was inserted and intravenous fluids administered. The tube proceeded rapidly and re-examination on the sixth hospital day showed the tip to be in the distal ileum. The patient appeared much improved and the tube was clamped. Distention immediately recurred and the patient again complained of abdominal cramps.

Laparotomy was performed on July 24, 1951, under spinal anesthesia. A large necrotic mass was found in the pelvis and delivered into the wound with ease. It arose from a diverticulum of the ileum which was located about 3 feet proximal to the ileocecal valve. A segment of ileum including the diverticulum and tumor was resected and an end-to-end anastomosis done. The patient's postoperative course was uneventful and he was discharged on the tenth postoperative day.

The pathologic report was as follows: Grossly, the specimen was a nodular, partially cystic, dark red to bluish mass measuring 13 cm. on its long axis and 7.5 cm. on its short axis. It was accompanied by a 7 cm. segment of intestine having a pedicle on its antimesenteric surface. The pedicle had a lumen continuous between the mass and bowel. Upon incising the mass it was found to be partially cystic, the cyst containing an abundance of bloody fluid. There were numerous, irregular, discrete and confluent areas of necrosis in the solid tissue. (Fig. 1.)

Microscopically, large areas of necrosis with associated hemorrhage were encountered. At the periphery of these areas were solid masses of tumor cells varying in size and shape. For the most part they were spindle-shaped with elongated, coarsely granular nuclei. Multinucleated giant tumor cells were encountered. Section through the bowel showed normal mucosa, submucosa and muscularis. The peritoneum was the seat of active fibroblastic proliferation and moderate lymphocytic in-

TABLE I*

Author	Pathologic Condition	Year
Wisely, A. N.	Medullary carcinoma	1931
Copeland, M. M.	Adenocarcinoma (primary site equivocal as tumor involved ileum, Meckel's diverticulum and umbilicus)	
Michael, P. and Bell, H. G.	Adenocarcinoma	1932
Franke, K.	Adenocarcinoma	1933
Brown, R.	Medullary carcinoma (probably of Meckel's diverticulum origin)	1933
Gray, H. K. and Kernohan, J. W.	Adenocarcinoma (arising from heterotopic gastric mucosa)	1937
Weir, J. M.	Adenocarcinoma	1937
Albright, H. L. and Sprague, J. S.	Adenocarcinoma	1942
Costich, K. J. and McNamara, W. L.	Adenocarcinoma	1946

* Modified from Nygaard and Walters.

TABLE II

Author	Pathologic Condition	Year
Virchow (cited by Fried)	Spindle cell sarcoma	
Kaufmann, E. (cited by Franke)	Myxosarcoma telangiectodes	1890
Fried (cited by Franke)	Myxosarcoma	1902
Kaufmann, E. (Basle collection)	Spindle cell sarcoma	1911
Tschiknawerow, L.	Spindle cell sarcoma	1911
Hassner, H.	Sarcoma	1913
Symmers, D.	Leiomyosarcoma	1919
Black, W. T.	Malignant cystadenoma, the stroma of which has undergone extensive myxomatous change	1919
Crile, G. W. and Portmann, U. V.	Spindle cell sarcoma	1925
Matthews, F. S.	Myoma in Meckel's diverticulum removed, 4½ yr. later malignant leiomyoma removed; site: in pelvis with no anatomic attachment; enucleated from attachments to abdominal wall and omentum	1925
Kernohan, J. W.	Leiomyosarcoma	1926
Konig, E.	Spindle cell sarcoma	1930
Faust, L. S. and Walters, W.	Fibrosarcoma	1931
Liccione, W. T.	Spindle cell sarcoma	1936
Nygaard, K. K. and Walters, W.	Leiomyosarcoma	1937
Skinner, I. C. and Walters, W.	Leiomyosarcoma	1939
Moses, W. R.	Leiomyosarcoma	1947
McGinnis, F. T.	Primary spindle cell sarcoma	1949

filtration. There was no histologic evidence of tumor in the section of bowel. (Figs. 2 and 3.)

The diagnosis was sarcoma arising in Meckel's diverticulum.

Because of the unusual nature of the lesion another opinion was sought. Dr. Arthur Purdy Stout reviewed the slides and submitted the following report: "I feel confident that your tumor originating in Meckel's diverticulum is composed of smooth muscle cells. They are spindle shaped, show longitudinally disposed cytoplasmic smooth muscle fibers and some tendency to palisade their nuclei. Some of the nuclei are of giant size but they are not anaplastic in appearance and there are extremely few mitoses. The tumor shows necrosis in some areas and degenerative tendencies in others. Where it is in contact with the muscular coat of the diverticulum, it shows microscopic invasion of the muscle. The degree of malignancy of this tumor is questionable because of the differentiation and the few mitoses. I think it is probably sufficient to warrant considering the case a leiomyosarcoma."

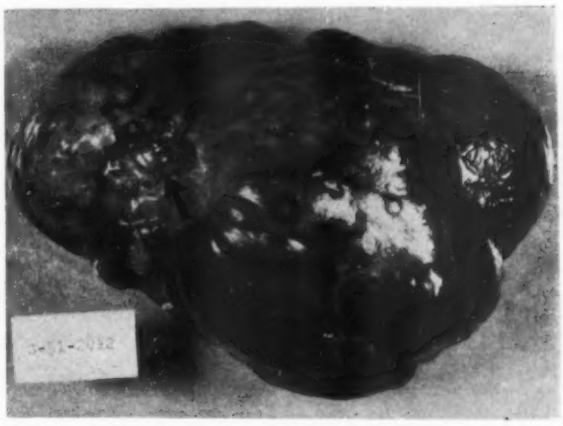
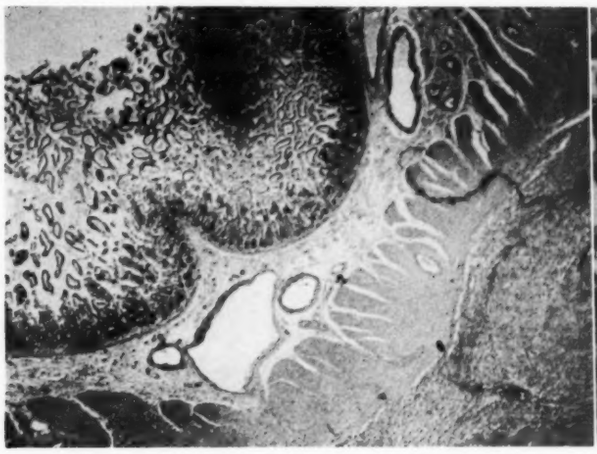


FIG. 1. Gross specimen of leiomyosarcoma. Note pouting mucosa of diverticulum indicated by arrow.



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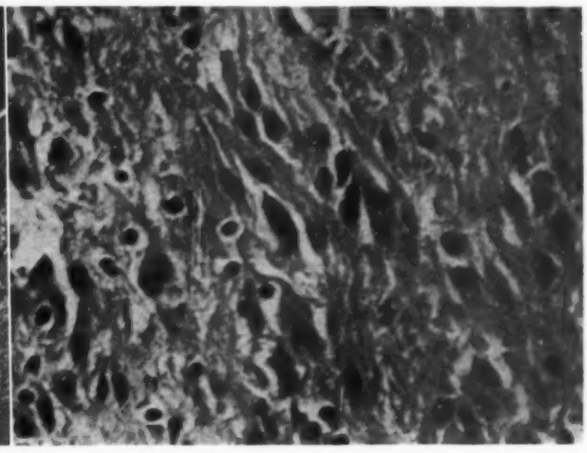

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FIG. 2. Wall of Meckel's diverticulum with tumor mass seen peripherally. × 25.

FIG. 3. Tumor cells showing spindle-shaped nuclei. × 440.

Comment. The patient remained well and asymptomatic during a follow-up period of twelve months, without evidence of recurrence.

SUMMARY

1. The embryology of Meckel's diverticulum and the disease processes to which it is subject are briefly reviewed.

2. The collected cases of malignant tumors in Meckel's diverticulum (carcinoma and sarcoma) are presented.

3. A case of leiomyosarcoma arising in Meckel's diverticulum is presented. This is the nineteenth case of sarcoma arising in Meckel's diverticulum to be reported in the literature.

Acknowledgment: The authors wish to express their appreciation to Dr. Arthur Purdy Stout of Columbia University College of Physicians and Surgeons and Dr. Frank A. Inda of Nassau Hospital, Mineola, N. Y., for their interpretation of the pathologic material.

REFERENCES

1. ALBRIGHT, H. L. and SPRAGUE, J. S. Primary adenocarcinoma in a Meckel's diverticulum. *New England J. Med.*, 226: 142–146, 1942.
2. BOCKUS, H. L. Gastroenterology, vol. II, pp. 54–56. Philadelphia, 1946. W. B. Saunders Co.

3. Costich, K. L. and McNamara, W. L. Carcinoma of Meckel's diverticulum. *Ann. Surg.*, 124: 503–507, 1946.
4. Gray, H. K. and Kernohan, J. W. Meckel's diverticulum associated with intussusception and adenocarcinoma of ectopic gastric mucosa. *J. A. M. A.*, 108: 1480–1483, 1936.
5. Hertzog, A. J. and Carlson, L. A. Carcinoid of Meckel's diverticulum. Report of two cases. *Arch. Path.*, 20: 587–589, 1935.
6. Koucky, D. and Beck, W. C. Perforated leiomyoma of Meckel's diverticulum. *Surgery*, 10: 636–641, 1941.
7. Liccione, W. T. Malignant tumors of Meckel's diverticulum. *Am. J. Surg.*, 34: 101–103, 1936.
8. Matthews, F. S. Meckel's diverticulum. *Arch. Surg.*, 10: 720–729, 1925.
9. McGinnis, F. T. Primary spindle cell sarcoma in a Meckel's diverticulum. *Surgery*, 25: 122–126, 1949.
10. Moses, W. R. Meckel's diverticulum. Report of two unusual cases. *New England J. Med.*, 237: 118–122, 1947.
11. Nygaard, K. K. and Walters, W. Malignant tumors of Meckel's diverticulum. *Arch. Surg.*, 35: 1159–1172, 1937.
12. Olson, J. D., Dockerty, M. B. and Gray, H. K. Benign tumors of the small bowel. *Ann. Surg.*, 134: 195–204, 1951.
13. Pack, G. T. and Livingston, E. M., Editors. Treatment of Cancer and Allied Diseases. By One Hundred and Forty-Seven International Authors, vol. II, p. 1285. New York, 1940. Paul B. Hoeber, Inc.
14. Paulter, E. E. and Scotti, T. M. Carcinoid in Meckel's diverticulum. Report of case and review of literature including usual and unusual sites of carcinoids. *Gastroenterology*, 17: 88–95, 1951.
15. Weir, J. M. Carcinoma of Meckel's diverticulum. *Arch. Path.*, 24: 791–793, 1937.

Pain in the breast should make one anxious to rule out the possibility of cancer. Breast abscess and traumatic fat necrosis also cause pain in the majority of cases, but other lesions rarely cause pain. In the latter instance the probable diagnosis is chronic cystic mastitis or a benign tumor. (*Richard A. Leonardo, M.D.*)

EVALUATION OF VASCULAR LIGATIONS IN REVERSING EXPERIMENTAL ASCITES*

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RECENTLY ligation of the hepatic artery alone or combined with ligation of the splenic artery has been recommended for the treatment of ascites.[1–6] The mechanism of this relief has been assumed to be due to a decrease in the volume and pressure of the blood in the liver. The fact that such vascular occlusion can be done with relative impunity has been demonstrated.[1–7] However, if all arterial supply to the liver is interrupted, which includes all collateral arteries, survival is not possible even with antibiotics.[8]

In order to evaluate properly surgical procedures for the treatment of ascites one should be able to produce ascites consistently and to be able to reverse the symptoms with some degree of regularity. We have attempted, therefore, to simulate the clinical entity of portal hypertension and ascites under controlled conditions and we have attempted to reverse it with vascular ligations.

EXPERIMENT

Using pentobarbital sodium anesthesia and aseptic technic, normal male and female mongrel dogs were operated upon under intratracheal artificial respiration with O_2 and 5 per cent Co_2 under slight pressure. The sixth right intercostal space was incised and a thin polyethylene strip, 1 inch wide, was tied around the vena cava above the diaphragm, constricting the lumen of the vessel 70 to 75 per cent. All dogs received antibiotics and were fed a mixture of frisky meal, horsemeat and table scraps. Body weights were determined at weekly intervals or more frequently, and aseptic peritoneal aspirations were performed to determine the development of ascites. In the following "ascites" denotes massive fluid in the abdomen which could be demonstrated by the usual clinical methods and when 50 ml. and more could be aspirated easily. The range of ascitic fluid in these animals varied between 3 and 5 L.

Ascites appeared two to three weeks following adequate constriction of the vena cava above the diaphragm, and it was from this point of time that its presence was counted in days. (Table 1.) The ascites was produced by back pressure into the hepatic veins.

In none of the experimental animals did the polyethylene constriction of the vena cava open up or relax. Ascites formed only when constriction was 70 to 75 per cent. Thus a number of animals in whom less constriction had been produced had to be reoperated upon in order to constrict the lumen adequately. If the degree of constriction was 80 per cent and above, all animals died, usually within twenty-four hours. Death apparently was due to shock and pooling of blood within the liver. The range of constriction of the vena cava above the diaphragm for producing ascites is rather narrow.

When animals with ascites were operated upon and the abdomen was opened, a large amount, probably most, of the ascitic fluid was lost. In every one of these animals massive ascites reformed within a few days.

Many animals died from intercurrent disease, such as distemper, pneumonia, skin ulcers, hemorrhage, anasarca, fluid in chest and congestion of the lungs, and of disease of the liver with emaciation and low values of serum albumin. A number of animals were sacrificed at various periods of time in order to obtain information about the development or the reabsorption of ascites.

Ascites was produced in thirty-three animals; ten were kept as controls to determine whether spontaneous reversal would occur.

In twenty-three dogs with ascites the following procedures were performed: The inferior cava was ligated below the level of the renal

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TABLE 1

EFFECT OF VASCULAR LIGATIONS ON ASCITES

Dog No.	Ascites Produced by Constriction of the Vena Cava above Diaphragm (Days)	Ligation of	Effect of Vascular Ligations on Ascites			Comment
			Persisted for Days	Disappeared for Days	Reappeared for Days	
1	5					Died; ascites
2	10					Sacrificed; ascites
3	25					Died; ascites
4	31					Died; ascites
5	33					Died; ascites
6	34			50	90, then disappeared 10	Sacrificed; no ascites
7	70					Sacrificed; ascites
8	71					Died; ascites
9	77					Sacrificed; ascites
10	212					Sacrificed; ascites
11		Vena cava below renal veins*	21			Sacrificed; ascites
12		Same	13			Sacrificed; ascites
13		Same	6			Died; ascites
14		Same Vena cava above renal veins*	35	279†		Reoperated upon; ascites † Sacrificed; no ascites
15		Same	7	2		Died; ascites
16		Same	133		11, then disappeared 6 22	Sacrificed; ascites
17		Same	33	38		Died; ascites
18	7	Vena cava above renal veins		7		Died; ascites
19	11	Same	115			Sacrificed; ascites
20	3	Same		112		Sacrificed; no ascites
21	7	Same	7			Died; ascites
22	4	Same	2			Died; ascites
23	17	Same	75			Died; ascites
24	10	Splenic artery at celiac axis	32	66		Sacrificed; no ascites
25	17	Same	60			Died; ascites
26	2	Hepatic artery at celiac axis	1			Died; ascites
27	2	Same	18			Lost
28	5	Same	16			Died; ascites
29	11	Same	3			Died; ascites
30	17	Hepatic artery and hepatic arterial tree excised	119			Sacrificed; ascites
31	10	Same	112			Sacrificed; ascites
32		Hepatic artery at celiac axis* Vena cava below renal veins	31 14			Sacrificed; ascites
33		Hepatic arteries at hilus of liver* Vena cava above renal veins Splenic artery at celiac axis	144	 95* 129‡		† At operation 25 ml. of ascitic fluid were found. ‡ Sacrificed; no ascites

* Simultaneously with constriction of vena cava above diaphragm.

veins in four, and above the level of the renal veins in eleven; the splenic artery was ligated and excised in two; the hepatic artery was ligated or the entire hepatic arterial tree was excised in eight, using a technic described previously.[7]

RESULTS

In dogs 1 to 10, constriction of the vena cava above the diaphragm was performed. (Table 1.) The animals were observed from five to 212 days after the development of massive ascites. Five dogs died, three were sacrificed and two (No. 6 and 10) are still living. In one of the ten animals (No. 6) ascites disappeared after it had persisted for thirty-four days. During fifty days of observation repeated attempts at peritoneal aspiration did not yield any amount of fluid. Then ascites reappeared and has persisted. The animal is living and in fair condition.*

In the next group of four animals, No. 11 to 14, in one operation the vena cava was constricted above the diaphragm and was ligated completely below the renal veins. In these four animals massive ascites developed and persisted. The last dog in this group, No. 14, was reoperated upon after thirty-five days of observation and the vena cava was ligated above the renal veins.

In dogs No. 15 to 17, at one operation the vena cava was constricted above the diaphragm and occluded completely above the renal veins. In this group of three animals ascites disappeared in two. In dog No. 15 ascites was present for seven days and then disappeared. However, the animal lived for only two days without ascites, which is too short a period of time to consider this as a successful reversal of ascites. In dog No. 17 ascites persisted for thirty-three days, disappeared completely for thirty-eight days, reappeared for eleven days and then disappeared completely for six days, after which time the animal died with massive ascites. We believe that ascites had reformed shortly before death.

In the next group of six animals (dogs No. 18 to 23) the vena cava was constricted above the diaphragm and the animals were observed until ascites had formed. Three to seventeen days later the vena cava was ligated completely above the renal veins. In dog No. 18 ascites did not reform following the second operation, but after seven days it reappeared and persisted for twenty-two days, after which time the animal died with massive ascites. In dog No. 20 three days following the development of massive ascites the vena cava was occluded above the renal veins. The animal was observed for 112 days, during which period of time no ascites could be detected. The animal was sacrificed and autopsy confirmed the complete absence of ascites. Dog No. 14 belongs to this group also. Ascites had been present for thirty-five days when the vena cava was ligated above the renal veins. Ascites did not reform during an observation period of 270 days; the animal was sacrificed and no evidence of ascites was found. Thus in three of seven animals in which constriction of the vena cava above the diaphragm was produced first and occlusion of the vena cava above the renal veins was done after massive ascites had occurred, ascites was reversed for periods of time of seven, 112 and 279 days, respectively.

In the next group of two animals, No. 24 and 25, ascites was produced first by constriction of the vena cava above the diaphragm. At a second operation the splenic artery was interrupted completely near the celiac axis. In dog No. 24 ascites persisted for thirty-two days following the second operation and then disappeared for a period of sixty-six days, when the animal was sacrificed. No ascites was found at autopsy. Animal No. 33 belongs to this group also. Thus ligation of the splenic artery affected ascites in two of three animals.

In the next group of eight animals with massive ascites, No. 26 to 33, the hepatic artery was ligated. In four dogs the ligature was placed near the celiac axis. In none of these animals was reversal of ascites observed. In two animals, No. 30 and 31, the hepatic artery and the entire hepatic tree were excised as described previously.[7] In both of these dogs ascites had been produced previously by constriction of the vena cava above the diaphragm, and in none of these animals did the ascites change following interruption of hepatic arterial blood flow during periods of observation of 119 and 112 days, respectively. In dog No. 32 simultaneous constriction of the vena cava above the diaphragm and ligation of the hepatic artery at the celiac axis were performed. Ascites

* In this dog (No. 6) the last episode of ascites persisted for ninety days and then disappeared again. Ten days later the animal was sacrificed and no ascites was found. The liver was large, fibrotic, and the lobes were adherent to each other. In dog No. 10 ascites persisted without change until the animal was sacrificed 212 days later.

persisted for a period of thirty-one days, when the vena cava was ligated completely below the renal veins. Ascites persisted for another fourteen days, at which time the animal was sacrificed. The diagnosis of massive ascites was confirmed at autopsy. In dog No. 33, at one operation constriction of the vena cava above the diaphragm and ligation of all arteries at the hilus of the liver were performed. Ascites developed which persisted for 144 days. The animal was reoperated upon and the vena cava was ligated above the renal veins. Ascites did not reform for a period of ninety-five days. At this time the animal was reoperated upon and 25 ml. of ascitic fluid were found in the abdomen. The splenic artery was ligated at the celiac axis and the animal was observed for another 129 days, during which period of time no ascites could be detected either by change of weight or by peritoneal aspiration. The animal was then sacrificed and no ascites was found at autopsy.

Findings at autopsy varied widely. In all animals that died or were sacrificed when ascites had persisted for a period of time, emaciation was present. In a number of animals congestion, atrophy and infarcts of the liver were found, particularly in those in which the splenic and hepatic arteries had been ligated. In dogs in which the inferior vena cava had been ligated above the kidneys, considerable enlargement and tortuosity of the azygos veins and their tributaries were noticed. In all animals in which the vena cava had been ligated thrombosis was found above the ligature. It is interesting to note that in no instance was thrombosis observed at or near the constriction of the vena cava above the diaphragm. In one animal (No. 21) two ligatures were placed on the vena cava above the renal veins approximately 1 cm. apart. The vein sloughed between the ligatures and the animal died from hemorrhage. It is possible that this event was due to the presence of two ligatures which interrupted the vasa vasorum of the vena cava. In one animal (No. 23) in which the vena cava had been ligated above the renal veins the ligature was too close to the right renal vein. Complete obstruction of the right renal vein and a calcified right kidney were found at autopsy. In one dog (No. 16) in which the vena and had been constricted above the diaphragm and ligated completely above the renal veins, at autopsy a small hard liver was found, the peritoneal surface of which had the appearance of sugar coating (Zuckerguss).

The values for total proteins and albumin and globulin in plasma and in ascitic fluid did not show a relation between formation or disappearance of ascites.

COMMENTS

It is of interest to note the consistency with which animals with supradiaphragmatic constriction of the vena cava had a sudden gain of body weight a week or two prior to the appearance of ascites; yet when ascites appeared, body weight did not change in a number of animals. At autopsies or at reoperations it was found that this initial weight gain was associated with an enlarged, moist, edematous liver. It appears that this event preceded the onset of exudation of ascitic fluid.

Ascites produced by constriction of the vena cava above the diaphragm was not affected by ligation of the vena cava below the renal veins, or by more or less complete ligation of the arterial supply to the liver. Ascites produced by constriction of the vena cava above the diaphragm was reversed in a number of animals by ligation of the vena cava above the renal veins and by ligation of the splenic artery at the celiac axis.

In the dog constriction of the vena cava above the diaphragm produces portal hypertension and ascites. In man ascites usually is associated with portal hypertension, but the latter is caused by intrahepatic obstruction of blood flow rather than by suprahepatic obstruction as in our dogs. It is therefore debatable whether the ascites produced in our experiments approximates the condition of portal hypertension and ascites in man with cirrhosis of the liver, and whether the operations performed on the dogs, which led to disappearance of ascites, can be applied to man.

After this paper had been finished, we read the recent work of Milnes[8] who performed hepatic and splenic artery ligation in dogs with experimental ascites. He used rubber tube constriction of the vena cava above the diaphragm. This procedure led to a progressively increasing stenosis of the vein and to late development of ascites. However, the ascites disappeared spontaneously in most animals. Ligation of the hepatic and splenic arteries shortened the time of disappearance of the ascites. This confirms part of our results.

SUMMARY AND CONCLUSIONS

In thirty-three dogs ascites was produced by constriction of the vena cava above the diaphragm.

Of ten control animals, ascites disappeared spontaneously in one for a period of fifty days and then ascites reformed.* Occlusion of the vena cava below the renal veins did not affect ascites in four animals. Occlusion of the vena cava above the renal veins led to reversal of ascites in four of eleven animals. Occlusion of the splenic artery at the celiac axis led to disappearance of ascites in two of three animals. Incomplete or complete ligation of all hepatic arterial supply to the liver did not affect ascites in nine dogs.

REFERENCES

1. Rienhoff, W. F., Jr. Ligation of the hepatic and splenic arteries in the treatment of portal hypertension. *Bull. Johns Hopkins Hosp.*, 88: 368–375, 1951.
2. Blain, A. W. and Blain, A., iii. Ligation of the splenic artery, the operation of choice in selective cases of portal hypertension and Bantis syndrome. *Alexander Blain Hosp. Bull.*, 9: 130–138, 1950.
3. Moore, R. M., Singleton, A. O. and Pickett, W. H. Splenic artery ligation in palliation of ascites. *Ann. Surg.*, 131: 774–780, 1950.
4. Chenoweth, A. J. Early results following therapeutic ligation of the hepatic artery. *Ann. Surg.*, 135: 756–764, 1952.
5. Leger, L., Albot, G., Andot, J. and Zerolo, J. Ligation of hepatic artery in cirrhosis of liver. *Presse méd.*, 60: 176, 1952.
6. Berman, J. K. and Hull, J. E. Hepatic, splenic, and left gastric arterial ligations in advanced portal cirrhosis. *Arch. Surg.*, 65: 37, 1952.
7. Jefferson, N. C., Proffitt, M. M. and Necheles, H. Collateral arterial circulation to the liver of the dog. *Surgery*, 31: 724–730, 1952.
8. Popper, H. L., Jefferson, N. C. and Necheles, H. Interruption of all arterial blood supply to the liver not compatible with life. Experimental study. *Am. J. Surg.*, 84: 429–431, 1952.
9. Milnes, R. F. An evaluation of hepatic and splenic artery ligation in dogs with experimental ascites. *Surgery*, 32: 704–711, 1952.

* Ascites persisted for ninety days and then disappeared. No ascites was found at autopsy ten days later.

INTRATHORACIC HÜRTHLE CELL (OXYPHIL CELL) TUMOR OF THE THYROID*

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HÜRTHLE cell tumor is a rare lesion of the thyroid which has been recognized for nearly fifty years. This tumor usually occurs in the thyroid as an adenoma or carcinoma and may be associated with a nodular goiter. There are various theories of origin of the Hürthle cell type including a possible parathyroid relationship. In a review of the literature we have found only one report of an intrathoracic Hürthle cell tumor.[8] Our case is presented because of the unusual intrathoracic location of the tumor and secondly because its morphology suggests relationship to the parathyroid. A brief review of the various concepts of origin and treatment is included.

CASE REPORT

W. B., a seventy-three year old white man, was admitted with a history of progressive hoarseness of three months' duration, associated with difficulty in breathing and swallowing solid food. Other symptoms included weakness, anorexia, a 10 to 15 pound weight loss during the past year and slight pain in the right shoulder on motion. Three years previously he had been hospitalized elsewhere for a bleeding gastric ulcer and at that time a chest x-ray showed a mass in the right apex. (Fig. 1.) A miniature x-ray taken by a mobile unit shortly before admission revealed a similar lesion.

Physical examination disclosed a temperature of 38.2°C., pulse rate 100, respiration rate 20 and blood pressure 120/80. The voice was hoarse. A non-tender, soft, cyst-like mass approximately 2 by 3 cm. in diameter was present in the midline just below the level of the thyroid cartilage. A sinus tract led from the mass to an opening about 2 inches lower in the region of the suprasternal notch. (This was said to have been present since birth.) The veins in the right neck were prominent and dilated. The chest was dull to percussion at the right apex. Other physical findings were essentially normal for a man of this age.

Laboratory findings were as follows: the red blood count was 4,230,000, white blood count 12,200, and hemoglobin 11.5 gm. Differential: 71 per cent neutrophils, 7 per cent stabs, 17 per cent lymphocytes, 4 per cent monocytes. Urinalysis showed a slight trace of albumin and no sugar. The blood Kline test was negative. The serum cholesterol was 150 mg. per 100 cc. Cephalin flocculation was negative. An electrocardiogram showed: "Abnormal electrocardiograph with pattern of strain."

Fluoroscopic examination and x-ray plates of the chest revealed the esophagus to be displaced forward and to the left by a large, well demarcated, rounded, non-pulsating mass of homogeneous density occupying the right upper thorax extending down as far as the third rib anteriorly. No areas of calcification were seen. (Fig. 2.) In the right oblique view (Fig. 3) the mass appeared to occupy the midportion of the upper thorax. In this view anterior displacement of the trachea and of the esophagus with flattening of the esophagus was noted. At the lower margin of the mass the esophagus was tortuous with areas of constriction and dilatation. The aortic knob was displaced to the left. The lungs immediately surrounding the mass showed no inflammatory reaction and no compression atelectasis.

Anteroposterior stereoscopic and lateral views of the dorsal spine and the right upper ribs showed definite left scoliosis of the upper dorsal spine with an appearance typical of Paget's disease. There was no collapse of the bodies and no areas of obvious destruction. The right upper ribs showed no evidence of erosion.

The patient was operated upon by one of the authors (B. B. L.) under intratracheal anesthesia. A low thyroid collar incision was made. The muscles on the right were divided. The sternal and part of the clavicular insertion

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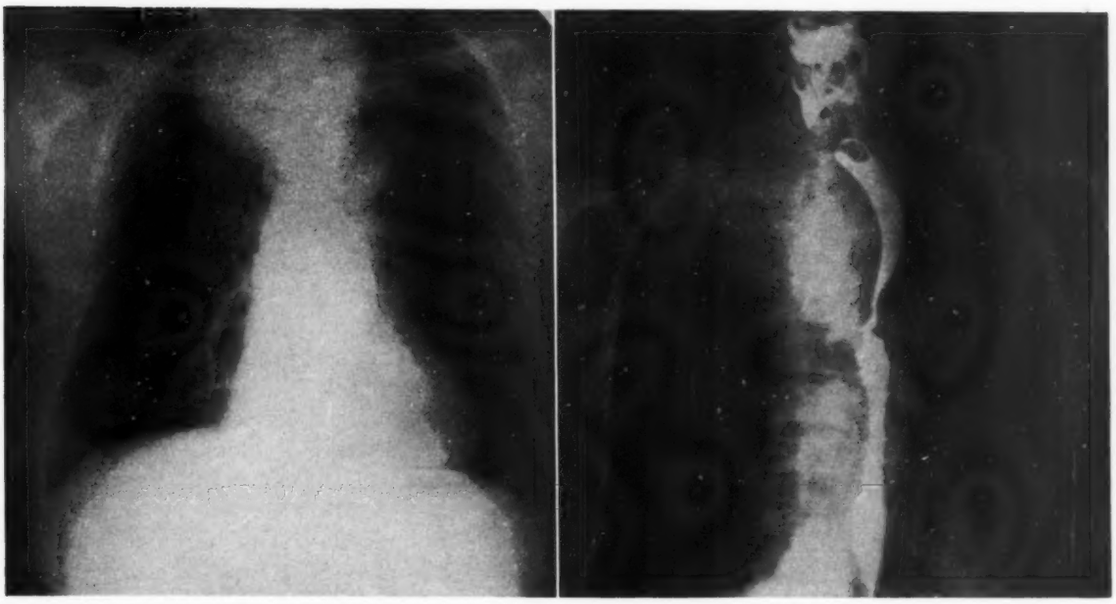

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FIG. 1. Postero-anterior roentgenogram of chest showing well defined intrathoracic mass on right.

FIG. 2. Roentgenogram of chest; the homogeneous mass has enlarged in the three-year interval. Note displacement of esophagus.

of the right sternocleidomastoid muscle was divided. The right lobe of the thyroid gland was found to be normal except the lower pole which extended down behind the clavicle and the first rib was attached to a large intrathoracic mass. The right half of the thyroid was removed and the intrathoracic mass was freed from the adjacent structures by blunt dissection. During this procedure the mass was ruptured and contained yellowish brown fluid. The greatly decreased size of the tumor made it easy to remove the lesion from the thorax by simple traction. After completing this part of the procedure the midline sinus tract and connecting thyroglossal duct cyst were excised and found to have no connection with the thyroid or the intrathoracic tumor.

The pathologic report was as follows: Grossly, the specimen consisted of a collapsed, empty, unilocular cyst measuring 8.5 cm. in greatest length and 7.5 cm. in diameter. The surface was roughened by fibrous tags, was mottled and varied from light brown to yellowish grey. In one portion of the external surface of the cyst wall was a well defined, encapsulated, firm mass measuring 2.5 by 2.0 by 1.8 cm. which on transection showed a bulging, uniform, homogeneous, pale yellow surface. The cyst wall was firm, grey and varied from 0.2 to 0.5 cm. in thickness. The lining was covered with a variable amount of yellowish grey material in which were glistening flecks, presumably cholesterol.

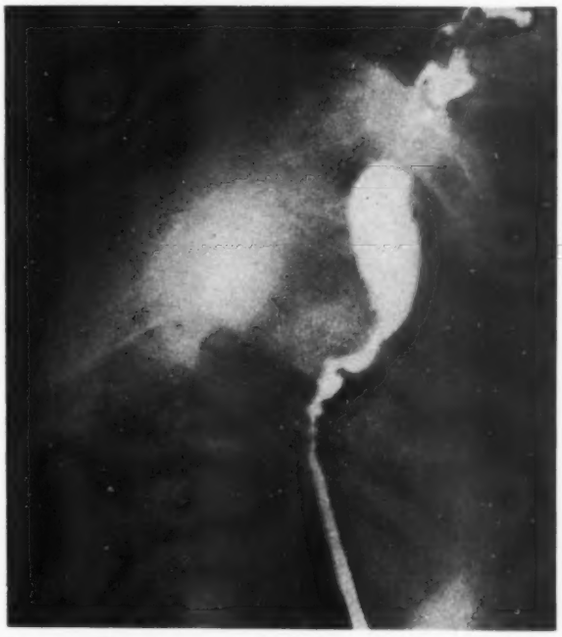

FIG. 3. Roentgenogram of chest in right oblique view showing anterior displacement of trachea and esophagus.

Microscopically (Fig. 4), the mass described in the cyst wall was composed of numerous cords, nests and small acini formed by large,

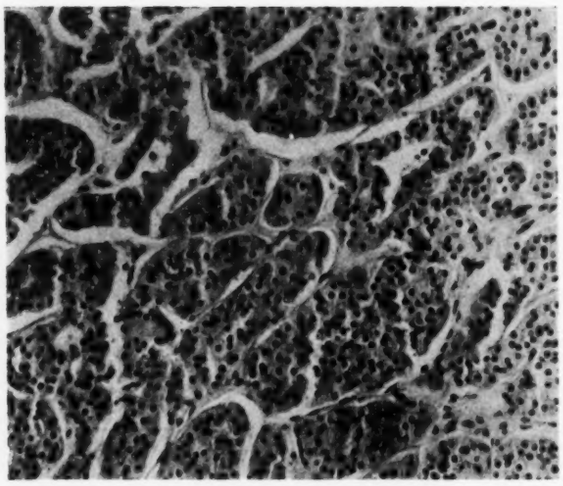

FIG. 4. Photomicrograph of Hürthle cell tumor. Note cords, nests and small acini formed by polyhedral and cuboidal acidophilic cells. × 202.

lumens contained small amounts of pink-staining, finely granular material. The stroma was sparse and for the most part consisted of septi containing thin-walled vascular channels. Blood vascular invasion and invasion of the capsule were not demonstrated.

The wall of the cyst (Fig. 5) was composed of relatively dense, collagenous tissue throughout which were scattered islands and nests of closely packed, relatively large, uniform polyhedral cells having clear, pale cytoplasm and round, dark-staining nuclei. These nests varied in size and number in different locations and were present in all sections of the wall. These cells have a striking resemblance to the chief cells of the parathyroid gland.

In addition, the cyst wall contained numerous hyalinized foci. The lining of the cyst in many places was composed of granulation

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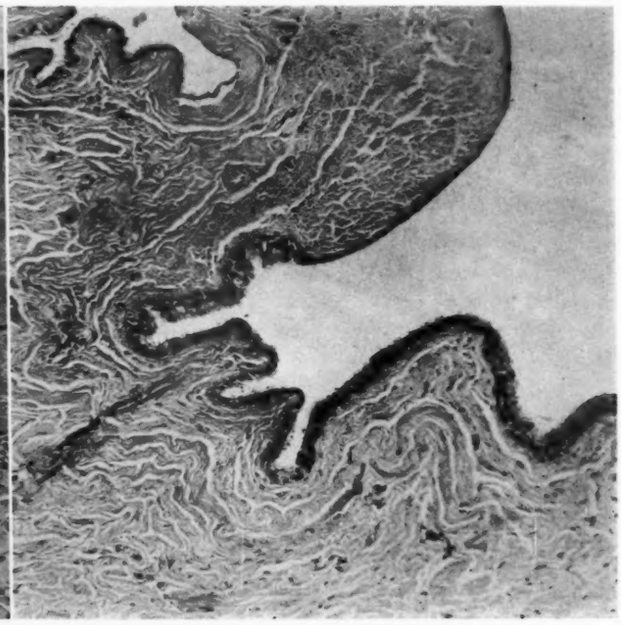

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FIG. 5. Photomicrograph of cyst wall. Note cell masses typical of chief cells of parathyroid. × 102.

FIG. 6. Photomicrograph showing typical thyroglossal duct cyst. This was not related to Hürthle cell tumor. × 120.

well defined, polyhedral and cuboidal cells having acidophilic, finely granular and occasionally vacuolated cytoplasm and relatively small, rather uniform, round nuclei in which the chromatin was finely stippled. In some instances the nuclei were eccentrically located. The cells measured 15 to 20μ in diameter. Where acini were formed, the cells were cuboidal and regular in arrangement. The tissue in which were cleft-like spaces, presumably cholesterol clefts. In these regions there were collections of granular, brown pigment.

The unrelated thyroglossal duct cyst was lined by pseudo stratified, ciliated, columnar epithelium. (Fig. 6.)

The patient made an uneventful recovery and was discharged on the eighth postoperative

day. He has been in good health for the past three years and there have been no signs of recurrence.

COMMENTS

There are four chief theories of origin of Hürthle cell tumors. In 1894 Hürthle[6] described large eosinophilic cells in the thyroids of young dogs and called them interfollicular cells. In 1907 Langhans[7] reported five cases of tumors composed of cells morphologically similar to the cells Hürthle described and called these tumors Hürthle cell tumors or small alveolar large cell adenocarcinoma. Getzowa[4] considered these tumors to arise from rests of the primary post-branchial body or lateral thyroid anlage. More recently these tumors have been considered related to origin from normally located or ectopic parathyroid cells. Hazard and Ingle[5] reported nine cases of oxyphil tumor of the thyroid, one of which showed cells of parathyroid chief cell type in the capsule and trabeculation. There was no clinical proof of parathyroid disease. Friedman[3] observed these cells in the thyroid gland in cases of myxedema, exhaustion atrophy, Hashimoto's struma, and in thyroids after irradiation, thioracil therapy and in the tissue left after subtotal resection for hyperthyroidism. This suggests that these cells may be a physiopathologic involutional variant rather than an anatomic variant of the thyroid cell.

The presence of large oxyphil cells in our case which resemble oxyphil cells of the parathyroid, plus the presence in the cyst wall of numerous nests and groups of large, clear, polyhedral cells bearing a striking morphologic resemblance to the chief cells of the parathyroid, is of great interest and lends some support to the concept of origin from parathyroid. There were no functional disturbances related to parathyroid hyperplasia although preoperative serum calcium and phosphorus determinations were not made. However, postoperative tetany or signs of hypoparathyroidism did not develop as might have occurred if this tumor were a functioning parathyroid tumor.

The clinical course is similar to other adenomas of the thyroid. About one-third of the reported cases have had signs and symptoms of hyperthyroidism. The incidence in females to males is approximately five to one and the age incidence is most frequently thirty to sixty although tumors have been reported in infants.

Of great importance from the practical standpoint is whether these tumors are benign or malignant. More than one-half of the cases reported to date have been proved to be malignant. This is often exceedingly difficult to determine as for the most part these tumors behave as do other tumors of the thyroid in that the cells may appear benign and yet blood vessel invasion or metastasis may occur as in other types of thyroid carcinoma. Some apparently are benign and others obviously are malignant.

We have considered this tumor to be benign and to date (three-year follow-up) there has been no recurrence or demonstrable metastasis. Frazell and Duffy[2] in the largest series reported to date have reviewed forty cases observed over a twenty-year period and consider these tumors to be malignant. They report that metastases were present in the cervical lymph nodes at some time during the clinical course in ten, or 25 per cent, of the patients. Metastases were noted in bones (twelve), lungs (six) and miscellaneous other viscera (eight). Three of nine cases studied by Hazard[5] were malignant.

It is generally agreed that surgery is the best form of treatment. Usually these tumors are not recognized as Hürthle cell tumors until microscopic study is made. The extent of the surgery needed is determined as in other adenomas or adenocarcinomas of the thyroid. Frazell and Duffy[2] recommend radical neck dissection in event of recurrence or residual cancer and state that postoperative irradiation has been discouraging.

SUMMARY

A case is recorded of intrathoracic Hürthle cell (oxyphil cell) tumor of the thyroid occurring in a seventy-three year old white man. The patient is alive and well three years after surgery, with no evidence of recurrence or metastasis. The morphologic aspects of this tumor are presented, concepts of origin are reviewed and treatment briefly discussed.

REFERENCES

1. Eisenberg, A. A. and Wallenstein, H. Hürthle cell tumor. *Arch. Path.*, 13: 716, 1932.
2. Frazell, E. L. and Duffy, B. J. Hürthle cell cancer of the thyroid. *Cancer*, 4: 952, 1951.

3. Friedman, N. B. Cellular involution in the thyroid gland; significance of Hürthle cells in myxedema, exhaustion atrophy, Hashimoto's disease and the reactions to irradiation, thiouracil therapy and subtotal resection. *J. Clin. Endocrinol.*, 9: 874, 1949.
4. Getzowa, S. The parathyroid gland, intrathyroid cell masses of the same and rest of post-branchial body. *Virchows Arch. f. path. Anat.*, 188: 181, 1907.
5. Hazard, J. B. and Ingle, J. D. The so-called Hürthle cell tumor of the thyroid gland. (Scientific Proceedings.) *Am. J. Path.*, 23: 865, 1947.
6. Hürthle, K. A study of the secretory process of the thyroid gland. *Arch. f. d. ges. Physiol.*, 56: 1, 1894.
7. Langhans, T. Ueber die epithelialen Formen der malignen Struma. *Arch. f. Path. Anat.*, 189: 69, 1907.
8. Ward, G. E., Hendrick, J. W. and Chambers, R. G. Carcinoma of the thyroid gland. *Ann. Surg.*, 131: 473, 1950.

Rarely a benign rather than a malignant tumor may arise from the fundus of the gallbladder. Clinically, patients may present symptoms suggesting cholecystitis, with or without stones, but the x-rays show a constant filling defect. Usually the benign growth is an adenoma, although if multiple, polyps are the likely diagnosis, especially if pedunculated. Probably in all such benign growths a cholecystectomy should be performed as these tumors may eventually become malignant. (*Richard A. Leonardo, M.D.*)

TRICHLORETHYLENE ANESTHESIA IN PEDIATRIC UROLOGY*

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ANESTHESIA in children should be anesthesia without fear. This is especially true in anesthesia for urologic procedures since so many of these children must be anesthetized on multiple occasions. In this group of patients it is of paramount importance that the anesthesiologist be patient, understanding and acutely aware of even slight physiologic derangements. Hypoxia and hypercapnia—both so easy to achieve with open-drop ether—must be carefully avoided, as must the hyperpyrexia that can quickly occur in closed systems. In such urologic procedures as cystoscopies and transurethral resections the additional hazard of explosion of a flammable mixture is present.

Recently trichlorethylene became available in this country. Although first used as an anesthetic agent in 1935, it did not become popular until after Hewer published his results in 1941.[1] Since then it has been administered well over a million times in Great Britain alone,[2] chiefly in obstetrics and dentistry for analgesia.

It is a colorless liquid (for identification purposes colored blue by the addition of 1:200,000 waxolene blue), resembling chloroform ($CHCl_3$) in odor as well as chemical formula (C_2HCl_3). Its specific gravity is 1.47, vapor density 4.53 and boiling point 87°C. Its volatility is so low that it is unsuitable for use by the open-drop method.

Its lack of pungency makes its induction smooth and pleasant. Liver function is less disturbed than with ether.[3] Changes in blood-sugar and blood-urea values appear to be negligible.[1] Renal function is not altered to any significant degree.[4] Clinically, cardiac arrhythmias are infrequent. Capillary oozing from cut surfaces is said to be reduced.[3] It will not burn or explode under clinical conditions.

Preoperative medication is administered ninety minutes before the induction of anesthesia. This is done in accordance with the following dosage chart, bearing in mind that the apparent is more important than the real age.[5] As a rule of thumb, we expect a child to weigh 20 pounds at one year and to gain 5 pounds each additional year. However, each child should be judged on his general development, physical status and chronologic age.

Age (yr.)	Hyoscine (gr.)	Demerol (mg.)
Up to 1	1/600	..
1– 2	1/400	..
3– 4	1/300	15
5– 6	1/200	25
7– 8	1/200	35
9–12	1/200	50
over 12	1/150	75

In order to eliminate apprehension, basal anesthesia is achieved on the ward by the administration of 10 per cent pentothal® rectally. Fifteen minutes preoperatively 0.2 cc. per pound of body-weight, up to 15 cc., is instilled. Upon withdrawal of the rectal tube the buttocks are securely taped with a strip of adhesive to avoid loss of the solution. From the moment the pentothal is administered we insist that the children be handled quietly and gently, that they be allowed to fall asleep and that they not be talked to or played with. Within ten minutes they fall quietly asleep and are only then transferred to the operating rooms.

In children over ten intravenous rather than rectal pentothal is used to achieve this basal anesthesia. We prefer a 2 per cent solution since this is much less irritating than more concentrated solutions and we have never seen postanesthetic thrombophlebitis or slough from accidental extravenous injection with this solution.

Using the non-rebreathing mask recently described by Stephen and Slater,[6] the anesthesia is induced with a 15 L. flow of 50 per cent nitrous oxide-oxygen. Trichlorethylene is

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added in small amounts from a Heidbrink ether bottle without a wick and set at about the 3 mark. The induction is pleasant and rapid since trichlorethylene is not irritating to the respiratory passages. Anesthesia sufficiently deep for such procedures as cystoscopy, transurethral resection, trocar cystotomy and correction of hypospadias can be maintained with a concentration of about 1 per cent trichlorethylene in the inhaled atmosphere. Properly used, the average respiratory rate with trichlorethylene is 20 to 30 per minute. Overdosage produces tachypnea by stimulating both sets of fibers of the Hering-Breuer reflex, resulting in an inefficient tidal exchange. Stimulation of the pulmonary stretch-receptors causes an increase in rate and decrease of depth of respiration; stimulation of the deflation-receptors produces further increase in the respiratory rate. This tachypnea can be quickly overcome by a decrease in the concentration of oxygen under moderate pressure.

If further relaxation is required, it can be obtained by the use of a muscle relaxant. We use flaxedil® in a dosage of 1 mg./kg.

In order to prevent the accumulation of even small amounts of carbon dioxide we empty the atmosphere under the mask every five minutes.

In this series of thirty cases our patients have ranged in age from two to thirteen years. Operations have included cystoscopies, transurethral resections, hypospadias corrections, trocar cystotomy, Torek operations, cystograms, urethrograms and retrograde pyelograms.

All of these patients did well both during and after the operations. Most had reacted by the time they reached the recovery room and many did within two or three minutes after the close of operation; none had a prolonged recovery period. Vomiting was rare and nausea uncommon.

Although this series is small, the results are most encouraging and warrant the further use of this method of basal narcosis with pentothal, either rectal or intravenous, and anesthesia with nitrous oxide-oxygen-trichlorethylene, using a non-rebreathing mask. It is pleasant, non-inflammable and safe for pediatric urologic procedures not requiring deep relaxation.

Acknowledgment: I am indebted to Dr. Meredith F. Campbell, whose cases these were, for his generous interest, encouragement and criticism.

REFERENCES

1. Hewer, C. Trichlorethylene as inhalation anaesthetic. *Brit. M. J.*, 1: 924, 1941.
2. Hewer, C. L. Recent Advances in Anaesthesia and Analgesia (Including Oxygen Therapy), p. 107. Philadelphia, 1948. The Blakiston Co.
3. Lee, J. A. A Synopsis of Anaesthesia, p. 69. Baltimore, 1950. William & Wilkins Co.
4. Evans, F. T. Modern Practice in Anaesthesia, 1949, p. 431. New York, 1949. Paul B Hoeber Inc.
5. Lee, M. D. and Belton, M. K. Pediatric Anesthesia, p. 3. New York, 1948.
6. Stephen, C. R. and Slater, H. M. A non-rebreathing mask. *Anesthesiology*, 13: 226–229, 1952.

MODIFIED TWIN STITCH TECHNIC FOR URINARY INCONTINENCE*

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THE cause of female urinary incontinence which needs surgical repair is a dropped floor of the bladder. Anatomic and physiologic studies of the mechanism of bladder control revealed that the urethral tube is simultaneously bent and compressed by elevation of its posterior wall toward the symphysis by a semi-circular muscle which is in close connection with the posterior circumference of the urethra. The elevation of the posterior wall of the urethra in the sphincter region by a sling of fascia has proved sufficient for complete restitution of bladder control. Suturing of the sphincter muscle itself or the use of muscular tissue for support is not necessary. The result of the operation depends apparently on the formation of a sturdy and lasting band of fascia to elevate the floor of the bladder.

This article describes a surgical procedure for the treatment of urinary incontinence by the vaginal approach, which gives excellent results. The idea is to use the modified twin stitch technic for the formation of a supporting band which is created from the vesicovaginal fascia. The modification of the original twin stitch technic[1] offers a mechanical effect which cannot be obtained with the original twin stitch technic or any other type of sutures.

TECHNIC

A midline incision is made through the anterior vaginal wall from about 1 cm. below the external urinary meatus to the cervix. The knife cuts through the entire thickness of the vaginal mucosa but not through the underlying vesicovaginal fascia. The vaginal mucosa is separated to both sides and the intact vesicovaginal fascia is exposed. Two identical stitches (twin stitches) are applied to the right and the left of the bladder neck in the sphincter region. (Fig. 1A.) The lower ends of the ligatures (A2, B2) are united first by a flat square knot (Fig. 1B) which is tied in the air. The harmful effect of the cutting loop which would be created by a mattress suture is eliminated by this square knot which, in addition, strengthens the fine suture material at its weakest point. The knotholder[2] (K) is applied immediately behind the square knot (S). (Fig. 1C.) Here the instrument acts as a barrier in order to prevent the knot (S) from being pulled through one of the stitch canals. The formation of the transverse band of fascia starts with the tying of the second knot. (Fig. 1E.) Sliding of the ligature, which must be tied under a certain tension, is avoided by keeping the knot in place with the knotholder. (Fig. 1E.) The surgeon can readily complete the second square knot (S2) with relaxed threads. No harm is done to the suture material because the blades of the knotholder are completely smooth without having the usual crests and grooves. (Fig. 2.) Even if the second half of the square knot (S2) is tied over one of the fine, conical blades (Fig. 1E), the instrument can readily be removed simply by opening the lock and pulling the caught blade out of the ligature loop.

COMMENT

The main reasons for failures by the vaginal approach are: (1) defective exposure of the vesicovaginal fascia; (2) damaging of the fascia by the application of improper stitches; (3) insufficient elevation of the bladder floor.

First, the vesicovaginal fascia must be kept in close connection with the bladder. Undermining of the vaginal wall with a pair of scissors frequently separates the vaginal wall, together with the vesicovaginal fascia, from the bladder instead of leaving the fascia in close connection with the bladder wall. The following splitting of the vaginal mucosa in the midline naturally splits the fascia also. Separation of the dissected fascia from the vaginal mucosa afterward weakens and destroys to a great extent this invaluable tissue which is not suitable for a reliable support anymore.

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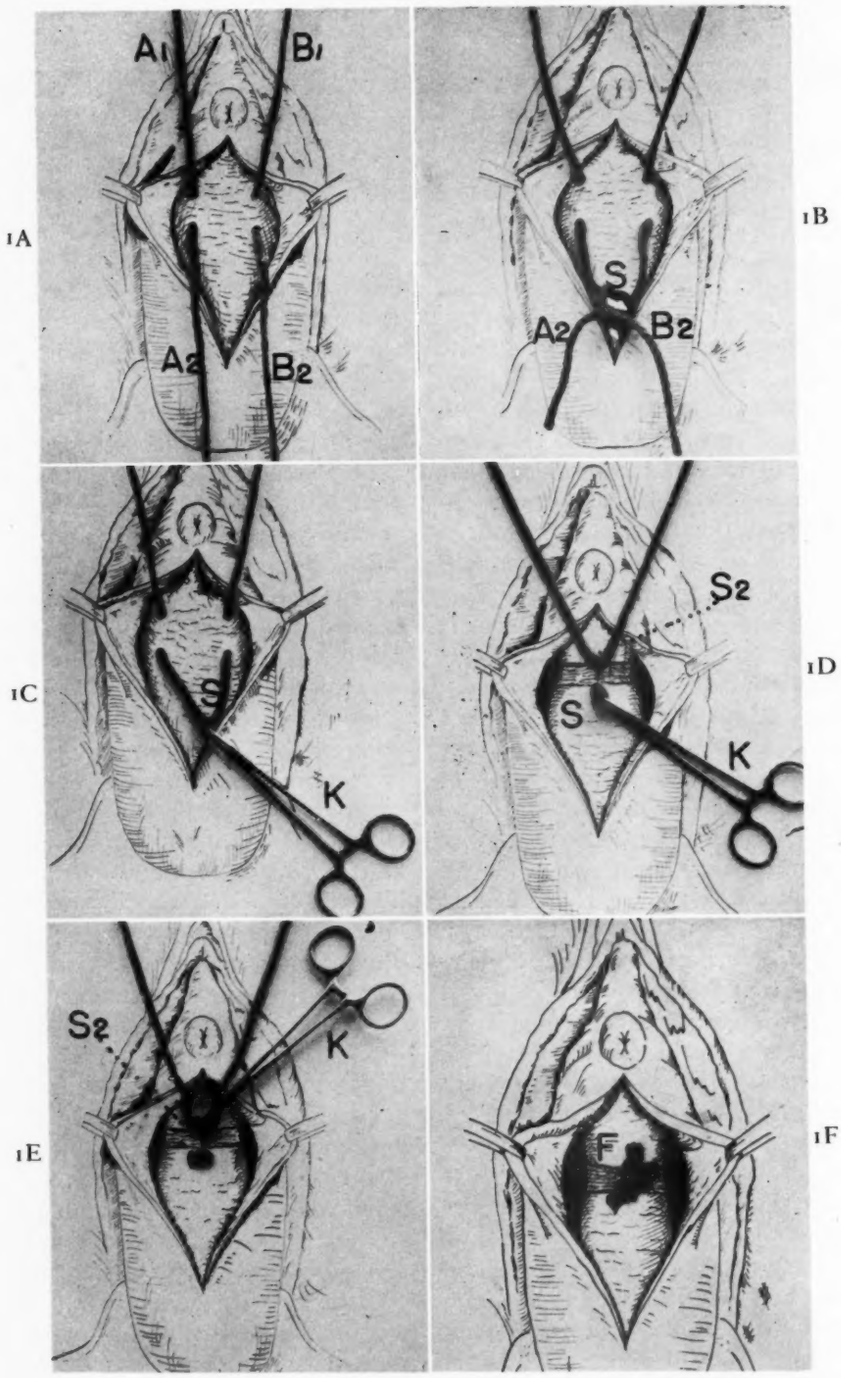

FIG. 1. A, twin stitches (A1, A2) and (B1, B2) are applied to the right and left of the bladder neck. B, the lower ends of the twin stitches (A2) and (B2) are united first by the square knot (S), which is tied in the air. C, the knotholder (K) is applied immediately behind the square knot (S). The excess of the ligature is cut short. D, the instrument (K) prevents the knot (S) from being pulled through one of the stitch canals. Tying of the second square knot (S2) starts the formation of the transverse band of fascia. E, the assistant has removed the instrument (K) from the first square knot and holds (S2) in place. The surgeon is completing S2 with relaxed threads. F, the procedure (A to E) has been repeated and a strong transverse band of fascia (F) in the sphincter region has been formed.

Secondly, the intact fascia which has been obtained by careful separation of the vaginal wall must not be spoiled by the sutures. Simple transverse stitches have a tendency to cut and tear the fascial tissue the very moment the ligature is tightened. Mattress sutures, which are frequently used, have an even more destructive effect on the fascia; they break and must be repeated and there is no doubt that additional stitches weaken the fascia. Furthermore, a simple mattress suture forms a dangerous loop; dangerous, because the loop cuts out a circular piece of fascia, or the blood supply of the encircled area is cut off, resulting in a necrosis of the fascia which has been used as support. The failure of the entire procedure and a recurrency of the incontinence is obvious. The modified twin stitch technic makes it possible to replace the dangerous loop of the mattress suture by a square knot which is kept in place by the knotholder. A symmetric traction on the fascia in the entire extension of the ligature in the stitch canals is accomplished by the resistance of the knotholder behind the knot. (Fig. 1D.) Thus a flat and wide band of well nourished fascia is obtained.

Thirdly, the elevation of the bladder floor must be sufficient. One or two pairs of twin stitches are usually not enough to make the band of fascia as sturdy as desired and to elevate the floor of the bladder sufficiently. The fine sutures of chromic catgut No. 00 will not tear and will not cut through the fascia even if the tension is increased by each additional pair of twin stitches. This elevating effect can hardly be accomplished by mattress sutures; they tear too frequently if tied under tension.

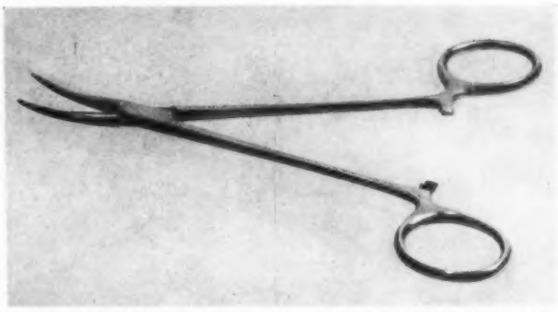

FIG. 2. Knotholder. The distal end of this clamp has a conical shape ending in a fine, but blunt point. The inside of the blades are perfectly smooth. The knot which is tied under tension can be held in place safely and the suture material will not be damaged.

SUMMARY

The formation of a transverse band of vesicovaginal fascia by the twin stitch technic modified by the knotholder is demonstrated. The danger of ordinary transverse stitches and mattress sutures is discussed. The multiple use of the knotholder and the favorable mechanical effect of the twin stitches in combination with this instrument are presented. The details of the operation for urinary incontinence are discussed and commented upon.

REFERENCES

1. TAUBER, R. Twin stitches: A new technic. *J. Internat. Coll. Surgeons*, 11: 200, 1948.
2. TAUBER, R. Knotholder. *Am. J. Obst. & Gynec.*, 64: 200, 1952.

EFFECTS OF EARLY AND LATE AMBULATION UPON THE SURGICAL PATIENT*

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EARLY ambulation of the surgical patient is now becoming an accepted policy in many surgical centers and clinics throughout the country. This method of postoperative management of patients has taken more than fifty years to gain a substantial and sound footing in our country. One of the earliest reports on the subject was by Ries in 1899.[11] The report by Leithauser in 1941 created a great stimulus to the study of this problem of early ambulation.[7] Since that time many favorable reports have appeared in the literature.[1-6,8-10]

This report is based on the study of the effects of early and late ambulation upon 2,955 patients who had major surgery performed at this hospital from September, 1946, to September, 1950. During the first two years of this period the policy and routine established was to ambulate patients after the sixth postoperative day. After this period practically all of the patients were ambulated before the third postoperative day. All patients ambulated within the first three postoperative days were classified in the early ambulation group, whereas those ambulated after the third day were placed in the late ambulation group. Ambulation in this study consisted of arising from bed, standing, walking and sitting either in a chair or on the side of the bed. The majority of patients in the early group were ambulated during the first twenty-four-hour period. Those in the late group were ambulated from the fourth to the fourteenth postoperative day; however, the majority in this group were ambulated after the seventh day. This sequence of activities with assistance to the patient was carried out two to three times daily until the patient was able to manage his own activities safely.

In all cases, whether the patient was ambulated early or late, deep breathing and leg exercises were started immediately after the patient reacted from his anesthetic. These activities were carried out several times a day for a period of time as required for each individual or specific groups of patients. Those scheduled for thoracic surgery received thorough preoperative instructions in breathing, upper extremity, shoulder girdle and posture exercises. They were well indoctrinated prior to surgery so that their cooperation in carrying out these exercises following surgery was easily elicited.

This organized program of bed and chest exercises and ambulation was a result of a combined and coordinated program instituted, supervised and conducted by the members of the Department of Physical Medicine in conjunction with the members of the Department of Surgery and its nursing staff. It is only through teamwork with a well developed and well organized Department of Physical Medicine that such a program as outlined previously can be carried out.

RESULTS

There was a total of 2,955 patients studied during this four-year survey. Of this number, 1,735 of the patients were ambulated early and 1,220 were ambulated late. The number and type of surgical procedures performed in both groups of patients are listed in Table I. The greatest number of operations studied were hernioplasties (49.2 per cent), appendectomies (28 per cent), sympathectomies (6.5 per cent), cholecystectomies (3.9 per cent) and gastrectomies (3.9 per cent).

A total of 196 (6.6 per cent) complications, including those of the wound, developed in this entire series. (Table II.) There were seventy-five complications in the group of patients

* From Veterans Administration Hospital, Des Moines, Ia. Sponsored by the Veterans Administration with the approval of the Chief Medical Director. Statements and conclusions published by the authors are a result of their own study and do not necessarily reflect the opinions or policy of the Veterans Administration.

ambulated early, or an incidence of 4.3 per cent; whereas, in the group of patients ambulated late, there were 121 complications, or 9.9 per cent. These totals included infections and hematomas of the wound. These two complications should not be considered as resulting primarily from early ambulation; however, they may be influenced by late or early ambulation. If these are not included, there were 110 complications, an incidence of 3.7 per cent. Of this number, forty-one (2.3 per cent) developed in the early ambulation group and sixty-nine (5.6 per cent) occurred in the late group.

The most frequent complications in both groups were pulmonary and gastrointestinal in type. The incidence of the former was 1.26 per cent in the early ambulated cases as compared to 2.95 per cent in the late cases. Ileus developed in thirteen (0.75 per cent) patients in the early group and in twenty-four (1.96 per cent) in the late group. The incidence of pulmonary embolism in both groups was low; two (0.11 per cent) in the group ambulated early, and four (0.32 per cent) in the late ambulatory group.

The patients studied were all men whose ages varied from eighteen to eighty-six years, the average age being forty-four years. The average age in the early ambulated group was 43.5 years, as compared to 44.5 years in the late group. The average age incidence in relation to the surgical procedures performed is listed in Table III.

TABLE I
OPERATIONS SURVEYED

Operation	Ambulation	
	Early (No.)	Late (No.)
Appendectomy	698	131
Cholecystectomy	93	23
Colectomy, partial	8	13
Common duct exploration	16	3
Gastrectomy, partial	45	63
Gastrectomy, total	4	5
Hernioplasty, epigastric or umbilical	28	46
Hernioplasty, femoral	17	18
Hernioplasty, incisional or ventral	4	33
Hernioplasty, inguinal	516	690
Hernioplasty, inguinal, recurrent	7	74
Lobectomy, pulmonary	21	5
Nephrectomy	16	18
Pneumonectomy	8	4
Splenectomy	5	2
Sympathectomy, dorsal	9	3
Sympathectomy, lumbar	120	32
Sympathectomy, thoracolumbar	13	18
Thoracotomy	25	20
Thyroidectomy, partial	48	4
Ulcer, peptic, perforated, closure	24	12
Vagectomy, infradiaphragmatic	10	3
Totals and per cent	1,735 (58.7%)	1,220 (41.3%)

TABLE II
COMPLICATIONS

Type	Ambulation			
	Early (1,735 Cases)		Late (1,220 Cases)	
	No.	Per cent	No.	Per cent
Atelectasis and/or pneumonia	20	1.15	32	2.60
Embolism, pulmonary	2	0.11	4	0.32
Ileus	13	0.75	24	1.96
Thrombophlebitis, acute	6	0.34	9	0.73
Wound, disruption	0	0	1	0.08
Wound, separation, partial	2	0.11	5	0.40
Wound, hematoma	20	1.15	19	1.55
Wound, infection	12	0.69	27	2.21
Totals	75	4.3	121	9.9

TABLE III
AGE INCIDENCE IN RELATION TO SURGERY PERFORMED

Operation	Average Age Incidence	
	Early Group	Late Group
Appendectomy	29.1	30.8
Cholecystectomy with or without choledochostomy	44.7	47.7
Colectomy, partial	48.7	47.3
Gastrectomy, partial	44	50.1
Gastrectomy, total	56.2	54.4
Hernioplasty, epigastric, femoral, and ventral	47.3	40.6
Hernioplasty, inguinal, primary and recurrent	49.8	43.6
Lobectomy, pulmonary	38	35
Pneumonectomy	54	50
Splenectomy	41	41
Sympathectomy, dorsal and lumbar	37.5	41
Sympathectomy, thoracolumbar	41	38
Thoracotomy	44	48
Thyroidectomy, partial	44	51
Ulcer, peptic, perforated, closure	38	44
Vagectomy, infradiaphragmatic	39	50
Average age	43.5	44.5

TABLE IV

COMPLICATIONS IN RELATION TO THE OPERATION PERFORMED

Operations		Atelectasis and/or Pneumonia	Embolism, Pulmonary	Ileus	Thrombophlebitis, Acute	Wound				Totals and Per cent
No.	Type					Disruption	Separation, Partial	Hematoma	Infection	
829	Appendectomy	7	2	16	5	.....	1	13	13	57,(6.8)
135	Cholecystectomy with or without choledochostomy	5	.....	2	1	.....	3	1	4	16,(11.8)
21	Colectomy, partial	1	.....	2	.....	.....	.....	.....	1	4,(19)
108	Gastrectomy, partial	4	1	.....	.....	.....	.....	2	.....	7,(6.4)
9	Gastrectomy, total	2	.....	1	.....	.....	.....	.....	1	4,(44.4)
146	Hernioplasty, epigastric, femoral and ventral	.....	.....	.....	1	.....	.....	3	2	6,(4.1)
1287	Hernioplasty, inguinal, primary and recurrent	14	1	11	4	.....	1	12	13	56,(4.3)
26	Lobectomy, pulmonary	4	.....	.....	1	.....	.....	.....	1	6,(23)
34	Nephrectomy	.....	.....	3	.....	1	.....	.....	1	5,(14.7)
12	Pneumonectomy	1	.....	.....	.....	.....	.....	.....	1	2,(16.6)
7	Splenectomy	.....	.....	.....	.....	.....	.....	.....	.....	0
164	Sympathectomy, dorsal and lumbar	3	1	1	1	.....	.....	3	.....	9,(5.48)
31	Sympathectomy, thoracolumbar	3	1	.....	.....	.....	.....	.....	.....	4,(12.9)
45	Thoracotomy	7	.....	.....	1	.....	1	1	1	11,(24.4)
52	Thyroidectomy, partial	.....	.....	.....	.....	.....	1	3	.....	4,(7.6)
36	Ulcer, peptic, perforated, closure	.....	.....	1	.....	.....	.....	.....	.....	1,(2.7)
13	Vagectomy, infradiaphragmatic	1	.....	.....	1	.....	.....	1	1	4,(30.7)
Totals and per cent 2,955	.....	52,(1.7)	6,(0.2)	37,(1.2)	15,(0.5)	1,(0.03)	7,(0.23)	39,(1.3)	39,(1.3)	196,(6.6)

TABLE V

COMPLICATION RATE IN RELATION TO OPERATION PERFORMED AND TIME OF AMBULATION

Early Ambulation							Late Ambulation						
Operation		Complications					Operation		Complications				
No.	Type	Atelectasis and/or Pneumonia	Embolism, Pulmonary	Ileus	Thrombophlebitis, Acute	Totals and Per cent	No.	Type	Atelectasis and/or Pneumonia	Embolism, Pulmonary	Ileus	Thrombophlebitis, Acute	Totals and Per cent
698	Appendectomy	5	1	8	3	17,(2.4)	131	Appendectomy	2	1	8	2	13,(9.9)
109	Cholecystectomy with or without choledochostomy	3	.....	1	1	5,(4.5)	26	Cholecystectomy with or without choledochostomy	2	.....	1	.....	3,(11.5)
8	Colectomy, partial	.....	.....	.....	.....	0	13	Colectomy, partial	1	.....	2	.....	3,(23)
45	Gastrectomy, partial	.....	.....	.....	.....	0	63	Gastrectomy, partial	4	1	.....	.....	5,(7.9)
4	Gastrectomy, total	1	.....	.....	.....	1,(25)	5	Gastrectomy, total	1	.....	1	.....	2,(40)
49	Hernioplasty, epigastric, femoral and ventral	.....	.....	.....	.....	0	97	Hernioplasty, epigastric, femoral and ventral	.....	.....	.....	1	1,(1)
523	Hernioplasty, inguinal, primary and recurrent	3	.....	3	1	7,(1.3)	764	Hernioplasty, inguinal, primary and recurrent	11	1	8	3	23,(3)
21	Lobectomy, pulmonary	2	.....	.....	1	3,(14.2)	5	Lobectomy, pulmonary	2	.....	.....	.....	2,(40)
16	Nephrectomy	.....	.....	1	.....	1,(6.2)	18	Nephrectomy	.....	.....	2	.....	2,(11)
8	Pneumonectomy	.....	.....	.....	.....	0	4	Pneumonectomy	1	.....	.....	.....	1,(25)
5	Splenectomy	.....	.....	.....	.....	0	2	Splenectomy	.....	.....	.....	.....	0
129	Sympathectomy, dorsal and lumbar	1	1	.....	.....	2,(1.5)	35	Sympathectomy, dorsal and lumbar	2	.....	1	1	4,(11.4)
13	Sympathectomy, thoracolumbar	1	.....	.....	.....	1,(7.6)	18	Sympathectomy, thoracolumbar	2	1	.....	.....	3,(16.6)
25	Thoracotomy	4	.....	.....	.....	4,(16)	20	Thoracotomy	3	.....	.....	1	4,(20)
48	Thyroidectomy, partial	.....	.....	.....	.....	0	4	Thyroidectomy, partial	.....	.....	.....	.....	0
24	Ulcer, peptic, perforated, closure	.....	.....	.....	.....	0	12	Ulcer, peptic, perforated, closure	.....	.....	1	.....	1,(8.3)
10	Vagectomy, infradiaphragmatic	.....	.....	.....	.....	0	3	Vagectomy, infradiaphragmatic	1	.....	.....	1	2,(66)
Totals and per cent 1,735	.....	20,(1.1)	2,(0.11)	13,(0.75)	6,(0.34)	41,(2.4)	1,220	.....	32,(2.6)	4,(0.32)	24,(1.9)	9,(0.73)	69,(5.6)

Catheterization was required in twenty-four (1.3 per cent) of the patients in the group ambulated early as compared to forty-eight (3.9 per cent) patients in the late group.

The type and incidence of complications according to the surgical procedures performed are tabulated in Table IV. The surgical procedures which were performed through a thoracic approach, such as lobectomies, pneumonectomies, total gastrectomies and thoracolumbar sympathectomies, resulted in a high complication rate, the majority of which were pulmonary in type. Abdominal operations which were extensive in scope likewise resulted in a moderately high complication rate. The complication rates for all surgical procedures in the early group were definitely lower than that of the late group. This is brought out in Table V which lists the number and type of operations performed and the complications which developed in each group in relation to early and late ambulation. Complications of all types in all of the surgical procedures surveyed occurred at least twice as frequently in patients ambulated late. In many instances this rate of incidence was much higher. This is particularly apparent in the following types of surgical procedures: appendectomy, cholecystectomy, partial gastrectomy and thoracolumbar sympathectomy.

TABLE VI
HOSPITAL STAY IN RELATION TO OPERATION AND TIME OF AMBULATION

Operation	Hospital Stay in Days	
	Early Ambulation	Late Ambulation
Appendectomy	7.9	11.9
Cholecystectomy	16.1	28
Colectomy, partial	12.5	40.1
Gastrectomy, partial	18.8	20.2
Gastrectomy, total	30	23.4
Hernioplasty, all types	8.8	12.6
Lobectomy, pulmonary	17	20
Nephrectomy	13	22
Pneumonectomy	37	45
Splenectomy	15	42
Sympathectomy, dorsal	13	14
Sympathectomy, lumbar	11	19
Sympathectomy, thoracolumbar	16	18
Thoracotomy	30	29
Thyroidectomy, partial	11	20
Ulcer, peptic, perforated, closure	11	16
Vagectomy, infradiaphragmatic	27	38
Average stay in days of all patients surveyed	17.3	24.3

The hospital stay for the patients ambulated early was shortened in practically all of the groups surveyed. The operative procedures and the period of hospital stay in the early and late groups are shown in Table VI. The total number of hospital days saved in the early group as compared with the late was 12,145 days, an average of seven days per patient in the early group.

A study of the effects of early and late ambulation upon the wound in this survey revealed that the incidence of wound complications was definitely reduced in the patients ambulated early. The incidence and type of complications according to the surgery performed is noted in Tables II and IV. Wound infection and hematomas occurred with equal frequency. (Table IV.) In the group of patients ambulated early these two complications occurred in thirty-two, or 1.8 per cent, of the cases as compared to forty-six, or 3.76 per cent, in the late group.

In this series of 2,955 patients there was only one wound disruption, an incidence of 0.03 per cent. This occurred in a patient who had a nephrectomy and who was ambulated late. There were seven patients in whom a partial superficial wound separation occurred; two (0.11 per cent) were in the early group and five (0.4 per cent) were in the late group, with a total incidence of 0.23 per cent. Practically all of the abdominal incisions were muscle-splitting in type, either oblique or transverse. In the appendectomy group the McBurney incision was employed, using catgut suture for wound closure. In all of the other operations surveyed, unless gross contamination occurred during surgery, the wound closure was accomplished by using a non-absorbable suture, usually silk; less frequently cotton or wire was used. The wounds healed rapidly in the group ambulated early, and the patients appeared to have less discomfort and generally required less sedation both in frequency and size of dose for the relief of pain.

The incidence of postoperative hernias was not increased by early ambulation as found in a separate definitive follow-up study of 564 primary inguinal hernioplasties. In the group of 236 patients ambulated the first day the

recurrence rate was 1.4 per cent as compared to 1.37 per cent in 406 patients ambulated late.[12,13]

There were thirty-six (1.26 per cent) hospital deaths in this survey of 2,955 patients. Seventeen, or 0.97 per cent, occurred in the early group and nineteen, or 1.5 per cent, in the late group. Of the thirty-six deaths which occurred during hospitalization, nineteen (0.63 per cent) were surgical and seventeen (0.57 per cent) non-surgical. Of the deaths which occurred as a result of surgery, seven (0.4 per cent) were in the early ambulated group and twelve (0.98 per cent) occurred in the late group. (Table VII.) Early ambulation was not a contributing factor in the cause of any of the surgical deaths; in fact, there were more surgical deaths in the group ambulated late than early. The higher complication rate occurring in the late group and particularly in the group of patients undergoing extensive major surgery may be a factor in a higher death rate in this group.

The causes of death in the early and late groups are listed in Table VIII. In the early group the seven surgical deaths were due to the following causes: massive bilateral atelectasis following appendectomy; coronary occlusion occurring after an appendectomy, a lumbar sympathectomy, and a cholecystectomy; peritonitis following partial gastrectomy and cholecystectomy; and cardiac failure which developed after pneumonectomy.

In the late group the twelve surgical deaths were a result of peritonitis in five cases following one partial and two total gastrectomies and two partial colectomies, acute mediastinitis in two cases following pneumonectomy and exploratory thoracotomy, cardiac failure following thoracotomy, massive atelectasis and tension pneumothorax in two other thoracotomy cases, and pulmonary edema and pulmonary embolism following a partial gastrectomy in two cases.

TABLE VII*

HOSPITAL DEATHS IN RELATION TO SURGERY PERFORMED

Operation		Surgical				Totals and Per cent	Non-surgical				Totals and Per cent
		Early		Late			Early		Late		
No.	Type	(No.)	(%)	(No.)	(%)		(No.)	(%)	(No.)	(%)	
729	Appendectomy	2	0.28	0	.....	2,(0.27)	2	0.28	0	.....	2,(0.27)
132	Cholecystectomy with or without choledochostomy	2	1.9	0	.....	2,(1.5)	0	.....	0	.....	0
21	Colectomy, partial	0	.....	2	15.3	2,(9.5)	0	.....	0	.....	0
108	Gastrectomy, partial	1	2.2	3	4.76	4,(3.7)	0	.....	0	.....	0
9	Gastrectomy, total	0	.....	2	40	2,(22.2)	1	25	0	.....	1,(11.1)
26	Lobectomy, pulmonary	0	.....	0	.....	0	0	.....	2	40	2,(7.7)
34	Nephrectomy	0	.....	0	.....	0	0	.....	1	5.5	1,(2.9)
12	Pneumonectomy	1	12.5	1	25	2,(16.6)	5	62.5	2	50	7,(58.3)
7	Splenectomy	0	.....	0	.....	0	1	20	0	.....	1,(14.2)
164	Sympathectomy, dorsal and lumbar	1	0.76	0	.....	1,(0.61)	0	.....	0	.....	0
31	Sympathectomy, thoracolumbar	0	.....	0	.....	0	1	7.7	0	.....	1,(3.2)
45	Thoracotomy	0	.....	4	20	4,(8.8)	0	.....	2	10	2,(4.4)
Totals 2,955		7	(0.4)	12	(0.98)	19,(0.63)	10	(0.57)	7	(0.57)	17,(0.57)

* The percentages in the early and late columns are based upon the number of surgical procedures performed in each group, and the percentages in the total columns are based on the total procedures as listed in the column under operations. The percentages of the totals at the bottom of the chart are based on the total number of patients operated in the early and late groups. (Table 1.)

TABLE VIII

CAUSES OF DEATH

Causes	Ambulation		Totals and Per cent
	Early	Late	
Atelectasis	1	1	2,(0.06)
Brain, metastasis	3	0	3,(0.10)
Cardiac, failure	3	1	4,(0.13)
Cerebral, vascular, accident	1	0	1,(0.03)
Coronary, occlusion	4	0	4,(0.13)
Edema, pulmonary	0	1	1,(0.03)
Embolism, pulmonary	0	1	1,(0.03)
Empyema, pulmonary	0	1	1,(0.03)
Esophageal, varices, hemorrhage	0	1	1,(0.03)
Leukemia, chronic	1	0	1,(0.03)
Malignancy, terminal	3	4	7,(0.23)
Mediastinitis, acute	0	2	2,(0.06);
Peritonitis, acute, generalized	2	5	7,(0.23)
Undetermined cause	1	0	1,(0.03)
Totals	19	17	36,(1.2)

There were seventeen non-surgical deaths during the hospital stay of the patients surveyed. Eleven patients died as a result of inoperable malignancy. Cardiac failure developed in two patients on the thirty-third and forty-third postoperative days; one occurred in a pneumonectomy case, and the other in a thoracolumbar sympathectomy patient. A coronary occlusion developed on the thirty-second day and a cerebral vascular accident on the twentieth day in two appendectomy cases. Two deaths occurred late in the period of hospitalization, one a result of chronic empyema and the other, a result of massive hemorrhage from a ruptured esophageal varix.

COMMENT

It appears from the study of the results of this survey that early ambulation in this group of surgical patients has merit in many respects. Of the entire group of patients representing a variety of major surgical procedures, it can be accurately stated that early ambulation had no untoward effects on these patients and that this type of program in conjunction with well established principles of surgical therapy has many favorable and desirable features.

The complications which developed following surgery are low in the entire series. The complication rate was definitely and persistently lower in the group of patients who were ambulated early. The pulmonary and gastrointestinal complications were less frequent in the early group. Urinary retention occurred three times more often in the group ambulated late.

The effects of early ambulation upon the wounds were most favorable. There was a definite decrease in wound complications in the early group. Early rising in no way contributed to delay in wound healing, to wound disruption or to hernia formation. By the use of muscle-splitting incisions and non-absorbable sutures, wound dehiscence occurred only once. The patients appeared more comfortable when ambulated early; they experienced less pain and discomfort in the operative site. Because of this the patient was more cooperative in his deep breathing exercises and coughing, thereby preventing accumulation of bronchial secretions in the lung with a resultant decrease in pulmonary complications.

The institution of early ambulation effected a great saving in hospital days. In these days of increased hospital costs and shortages of beds this economic factor alone is worthy of consideration. In the early ambulation group an average reduction of hospital stay of seven days for each patient occurred and represented a tremendous saving, both financially and from the standpoint of increased bed utilization. The average hospital stay in both groups of patients studied is considered low for these types of cases, since over 60 per cent of the patients came from great distances and, therefore, could not be discharged until they were able to travel by the normal means of transportation as provided in this community. The majority of the surgical patients in these groups had careful and complete work-up examinations as an inpatient prior to surgery, which in itself would increase the hospital stay. After discharge from the hospital the majority of the patients did not require continued outpatient care.

SUMMARY AND CONCLUSIONS

The effects of early and late ambulation in a group of 2,955 male patients who had major surgery performed at this hospital from September, 1946, to September, 1950, is presented. This study included the following surgical procedures: appendectomy, cholecystectomy, gastrectomy (partial and complete), colectomy, hernioplasty (various types), lobectomy, pneumonectomy, nephrectomy, splenectomy, sympathectomy, thoracotomy, thyroidectomy and vagectomy.

The patients ranged from eighteen to eighty-six years in age, the average age being 43.5 years in the early group and 44.5 in the late.

Early ambulation included patients who were up and out of bed within the first three postoperative days, whereas any ambulated after that time were classified as late. Ambulation consisted of arising from bed, standing, walking and sitting, either in a chair or on the side of the bed.

The complication rate was significantly lower in the group ambulated early, the incidence being 4.3 per cent in the early group as compared to 9.9 per cent in the late. All complications were less frequent in the early group. The most frequent complications were pulmonary and gastrointestinal; in the early group pulmonary complications occurred in 1.26 per cent of the cases and in the late group in 2.95 per cent of the cases, whereas ileus developed in 0.75 per cent of the cases in the early group as compared to 1.96 per cent in the late.

Catheterization was required in seventy-two

cases of this entire series, twenty-four (1.3 per cent) in the early group and forty-eight (3.9 per cent) in the late.

The average hospital stay of the patients ambulated early was shorter by seven days than the patients ambulated late. This represented a saving of 12,145 hospital days.

Early ambulation did not increase the incidence of wound complications; in fact there were fewer cases of wound hematomas and infections in the early group, 1.8 per cent in the early group and 3.76 per cent in the late. There was only one case of wound disruption and this occurred following a nephrectomy in a patient who was ambulated late. All of the abdominal wounds were muscle-splitting, either oblique or transverse in type; these were all closed with non-absorbable suture material, silk in the majority of cases, cotton and wire in the remainder. A McBurney incision was employed for appendectomies and these wounds were closed with catgut.

Early ambulation did not appear to increase the recurrence rate in inguinal hernioplasties. As evidenced by a follow-up of over 500 cases, the early group revealed a recurrence rate of 1.4 per cent as compared to 1.37 per cent in the late.

The patients ambulated early required less sedation and narcotics for the relief of pain and were rehabilitated more rapidly than those ambulated late.

The immediate postoperative mortality was not increased as a result of early ambulation; there were seven (0.4 per cent) surgical deaths in the early group and twelve (0.98 per cent) in the late group. The most frequent causes of death in both groups were a result of pulmonary complications and general peritonitis.

It appears from this study that early ambulation resulted in a more rapid rehabilitation of the patient, a shorter hospital stay, a significant reduction of the number of complications, a favorable healing of wounds with no increase in the incidence of postoperative hernias or wound disruption, a lowering of the postoperative mortality rate, a great saving in the cost of patient care, and the permitting of a more efficient bed utilization because of the rapid patient turnover.

REFERENCES

1. Blodgett, J. B. and Beattie, E. J. Early postoperative rising. *Surg., Gynec. & Obst.*, 82: 485, 1946.
2. Burch, J. C. and Bradley, C. F. Wound disruption and early ambulation. *Ann. Surg.*, 125: 768, 1947.
3. Canavarro, K. Review of 401 cases of early ambulation. *Bull. New York Acad. Med.*, 22: 264, 1946.
4. Canavarro, K. Early postoperative ambulation. *Ann. Surg.*, 124: 180, 1946.
5. Cornell, N. W. and Lin, D. T. W. Early mobilization of patients after major surgical procedures. *Surg., Gynec. & Obst.*, 85: 394, 1947.
6. Davison, T. C., Letton, A. H. and Hendry, W. M. Early ambulation; its advantages in 505 cases. *J. M. A. Georgia*, 36: 299, 1947.
7. Leithauser, D. J. Early Ambulation and Related Procedures in Surgical Management. Springfield, Ill., 1946. Charles C Thomas.
8. Marx, R. Early rising of patients following surgery. *West. J. Surg.*, 54: 275, 1946.
9. Powers, J. H. Postoperative thromboembolism—some remarks on the influence of early ambulation. *Am. J. Med.*, 3: 224, 1947.
10. Powers, J. H. Prompt postoperative activity after hernioplasty. *Arch. Surg.*, 59: 601, 1949.
11. Ries, E. Some radical changes in after treatment of celiotomy cases. *J. A. M. A.*, 33: 454, 1899.
12. Palumbo, L. T., Paul, R. E. and Emery, F. B. Results of primary inguinal hernioplasty. *Arch. Surg.*, 64: 384, 1952.
13. Palumbo, L. T. and Paul, R. E. Effects of early ambulation in primary inguinal hernioplasty. *Am. Surgeon*, 18: 1128, 1952.

Modern Operative Technics

No. 12

BOX TOP CLOSURE FOR HUGE INCISIONAL HERNIA*

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A PERSISTENT surgical enigma is the enormous incisional hernia occasionally encountered following the midline in-

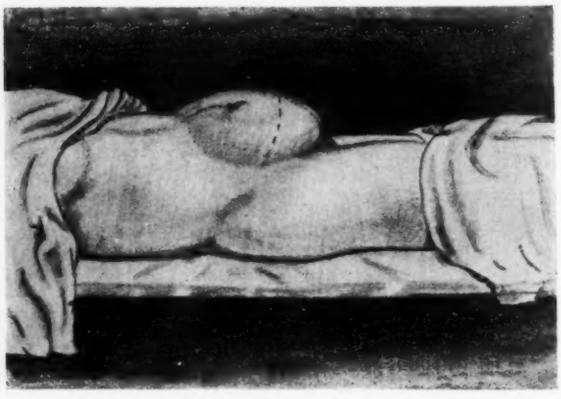

FIG. 1.

cision in the lower abdomen. Such a problem, it has been found, can usually be solved by a plastic procedure utilizing the patient's own tissues, locally available. Furthermore, it is possible to accomplish such a repair without serious encroachment upon the vital capacity of the abdominal space.

The general approach to the problem in the past has been to force a closure of the defect (as one would attempt to button a very tight vest) by lateral overlapping of two fascial layers, with excision of the peritoneal sac.

In contradistinction to such an approach, in this procedure the peritoneal sac is utilized to give substance to four flaps which are advanced diagonally to cover the defect, just as the end of a pasteboard box is closed by four overlapping flaps.

On first thought one would doubt the ability of the peritoneum to play an effective role in such a drama. And, indeed, in rare instances it is too thin to be of practical use.

However over a period of years we have been impressed that the peritoneal sac in these cases is usually thickened, redundant and infiltrated with scar tissue in such a fashion that a tough generous membrane exists. To excise and destroy this membrane when natural tissue is so badly needed for repair of this region seemed wasteful.

Furthermore, it has been constantly observed that about the periphery of the hernial opening the peritoneal sac is intimately fused with the fascia of the anterior sheath forming a dense fibrous ring. This, too, can be utilized.

THE OPERATION

Figure 1. The hernia; position of patient at beginning of operation; the incision.

Figure 2. (A) The large redundant sac has been dissected free exposing its line of fusion with the fascia at the periphery of the hernial opening. For the sake of clarity the sac here has not been opened. It is simpler, however, to open the sac prior to dissection. (B) Here the sac has been opened exposing adherent bowel. The sac is cleansed of fatty tissue as thoroughly as possible.

Figure 3. (A) At this stage the panniculus adiposus has been freed from the anterior surface of the fascia for a considerable distance. An incision is being made in the posterior sheath of the rectus. The incision is just posterior and peripheral to the line of fusion of the peritoneum to the anterior fascia. The incision is continued paralleling this line of fusion until the circle is complete, exposing the rectus muscle on each side. (B) The parietal peritoneum has been overlapped and sutured. The rectus muscles exposed. The two lateral flaps (peritoneal sac and fascia) are being sectioned transversely to create four flaps. Note

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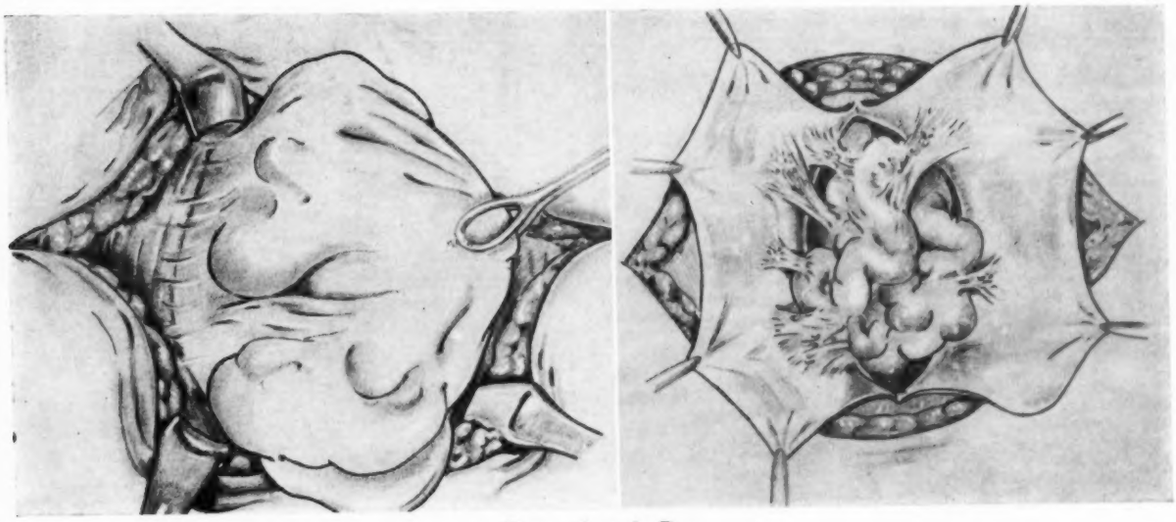
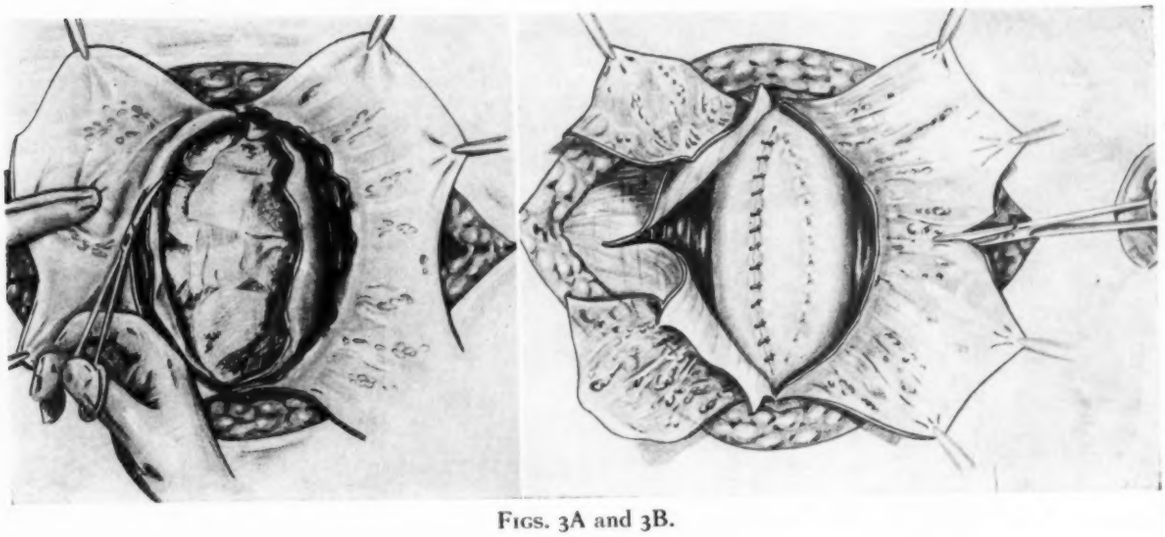


FIGS. 2A and 2B.



FIGS. 3A and 3B.

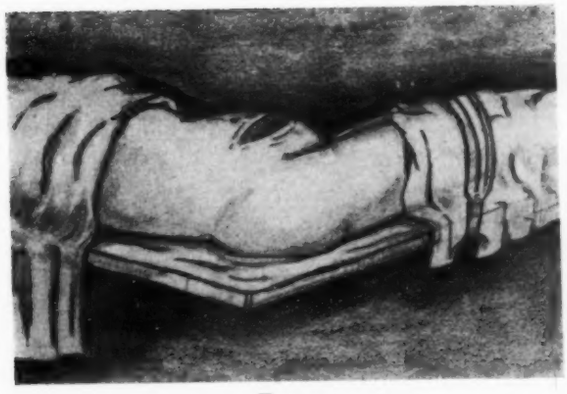
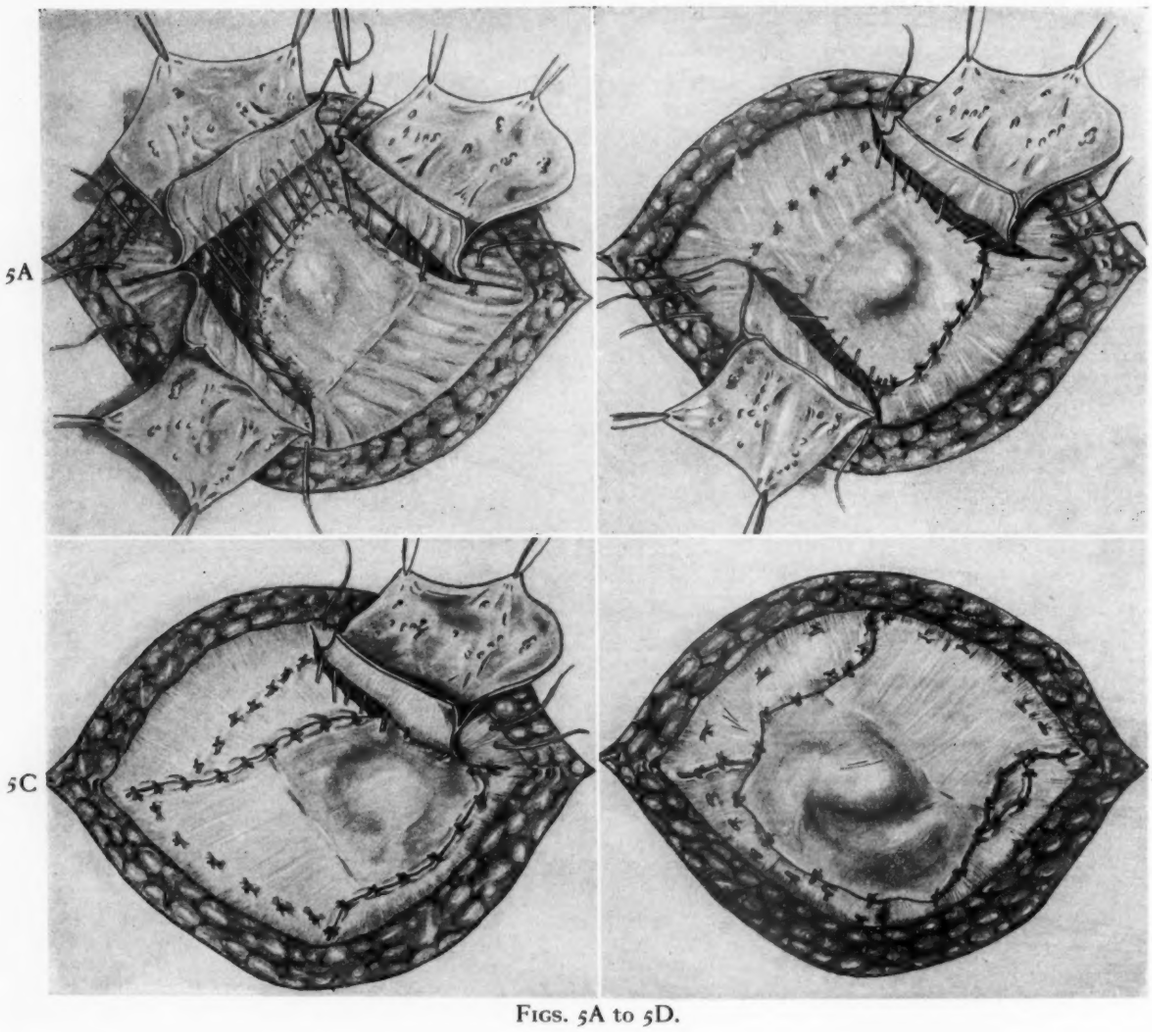


FIG. 4.



FIGS. 5A to 5D.

that the incision is carried laterally into the fascia for some distance beyond the hernial margin. The fascia is also incised vertically for 1 inch at the proximal and distal extremities of the opening. These flaps clockwise are 12–3, 3–6, 6–9 and 9–12, respectively.

Figure 4. Position of patient is now changed to semi-sitting posture. This narrows the vertical diameter of the hernial opening.

Recapitulation. The steps taken up to this point are as follows: (1) The sac has been freed and cleansed; (2) the fascia has been freed and cleansed; (3) the peritoneal sac has been preserved, left attached to and continuous with the fascia; (4) the parietal peritoneum has been freed, advanced and sutured in the midline; and (5) the two flaps have been quartered by crucial incisions extending peripherally well into the fascia. We are now ready to begin closure of the opening by advancing flap 3-6 diagonally upward across the center of the opening.

Figure 5. (A) The 3–6 flap is advanced diagonally, upward and across the opening to be sutured peripherally beneath the 9–12 flap. (B) The 9–12 flap is brought diagonally downward and sutured peripherally over the 3–6 flap. (C) The 6–9 flap has been advanced diagonally and sutured. (D) With the diagonal overlapping of flap 1–3 the closure of the defect has been completed. It will be noted that the suture of each flap as it is advanced progressively narrows the original opening and progressively lessens suture tension on those flaps which were previously advanced.

Figure 6. The operation completed. Temporary latex drains are used to carry away blood serum.

COMMENTS

The technic as shown is basic. It must be modified at times to fit the individual case.

It may be found that in certain instances only a portion of the sac can be utilized in this manner because of thinness of the sac in certain areas.

We do not know the ultimate fate of the peritoneum transplanted in the flaps. It evidently acts as a free graft which is eventually converted into fibrous tissue.

Such closure in ten cases of very large hernia has resulted in rapid healing with a firm abdominal wall.

SUMMARY

An x-flap plastic procedure is presented which affords a satisfactory closure of huge midline incisional hernia with the patient's own tissue, locally available.

Advantages in reconstruction are gained by: (1) preserving and utilizing the peritoneal sac; (2) preserving the line of fusion of sac to fascia; (3) Reducing the opening by position of the patient (jack knifing); (4) reducing the opening by utilizing natural cleavage planes, i.e., diagonal advancement of flaps; (5) four flaps instead of traditional two thicken wall where strength is needed; (6) suture of each of four flaps progressively reduces opening, and multiplicity of sutures progressively relieves suture tension; (7) broad surfaces of tissue contact give strength and stability to closure.

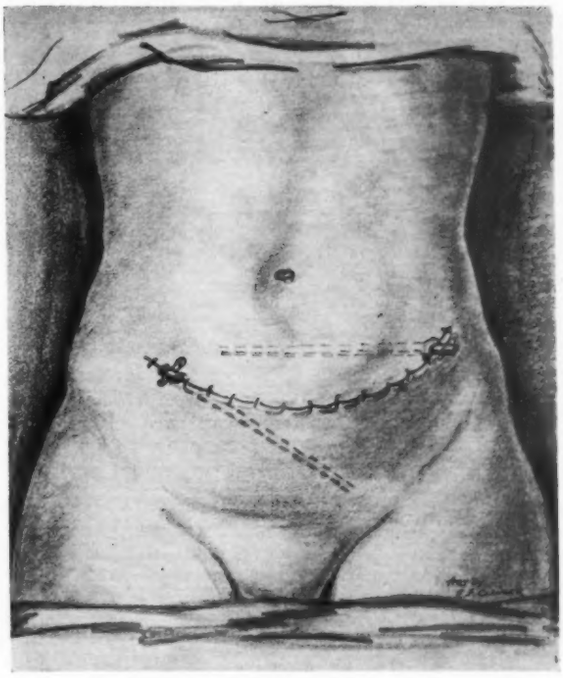


FIG. 6.

Streamlined Article

PROCTOLOGIC CONSIDERATIONS OF THE PERINEOPELVIC SPACES

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THE anatomic spaces, largely artefacts, are of practical importance in that they afford surgical orientation. In the perineum and pelvis they furnish a pattern and terminology for the pathogenesis and localization of the common infectious processes which are loosely classified on the basis of spaces, perianal, ischiorectal, supralevator and so forth.

The spaces are additionally of significance in the surgical management of the more common anorectal conditions, particularly the complicated anorectal fistula. Hence they are of particular interest to the proctologist.

* * * *

The perineopelvic spaces may be classified as follows:

(1) Infralevator
  (A) Perianal
  (B) Submucous
  (C) Postanal spaces
    (a) Superficial
    (b) Deep (posterior communicating space)
  (D) Ischiorectal (ischioanal)
(2) Supralevator
  (A) Superior pelvorectal space (deep pelvic)
    (a) Posterior compartment (rectal, both sexes)
    (b) Anterior compartment (vesicoprostatic and vesicovaginal)
  (B) Retrorectal (presacral)

PERIANAL SPACE

This space surrounds the lower third of the anal canal and forms the lower boundary or floor of the ischiorectal space. It contains the external hemorrhoidal plexus, the subcutaneous external sphincter muscle and the terminal extensions of the conjoined longitudinal muscle, the corrugator cutis ani. These muscles are fundamental to hemorrhoid, fissure and fistula surgery.

In hemorrhoidectomy exposure of the subcutaneous sphincter is a cardinal point in the technic since it marks the level at which the hemorrhoidal stumps should preferably be tied off in order to avoid denudation of the anal canal and the sphincteric portion of the rectum with the troublesome sequelae of delayed healing, stricture and a "frozen" anal canal.

Exposure and conservation of the longitudinal extensions are also important in the fixation of hemorrhoidal stumps and in preventing their retraction. The levator ani muscle through these conjoined longitudinal extensions exercises a very important supportive as well as sphincteric action on the anal musculature, particularly the subcutaneous portion. This is surgically significant. Intractable sensory and mechanical disturbances in defecation are sequelae of the Whitehead hemorrhoid operation and other proctoplastic procedures which unduly destroy the longitudinal extensions.

In fissure surgery the subcutaneous sphincter muscle is usually completely divided in the posterior portion of the perianal space commonly referred to as the posterior triangular or superficial postanal space.

The perianal space and not the ischiorectal space is the most common location for anorectal abscess and the subsequent fistulas are usually of the subcutaneous or low anal variety with the main tract parallel to the skin—a diagnostic feature.

SUBMUCOUS SPACE

This space surrounds the sphincteric portion of the terminal rectum above the dentate or anorectal line. It contains the internal hemorrhoidal plexus with its supportive matrix and

the terminal rectal lymphatics. Recognition of the boundaries of this space is pertinent to the injection treatment of internal hemorrhoids, particularly the submucous injection. The submucous space is highly significant to anorectal infections. The anal crypts at its lower or dentate margin are no doubt of some importance in the pathogenesis of the more common anorectal infections, but so-called "cryptitis" has been unduly emphasized and has confused the pathogenesis.

It may be noted that the mucous membrane overlying this space is in the dependent recess of the sphincteric portion of the rectum and is hence predisposed to stasis ulceration, lymphogenous infection and contact allergic inflammatory reactions. These factors are perhaps of greater etiologic significance to perianal infections, particularly in ulcerative proctitis, colitis, tuberculosis and granulomas than is commonly considered.

Although localized abscess is comparatively uncommon in the submucous space, subanodermal and submucous extension into it from fissure, fistula and the granulomatous processes is common.

The dentate or anorectal margin of the submucous space overlies the highly important sensory zone and excitor mechanism for defecation and other reflexes. Its preservation in the surgery of cancer, Hirschsprung's disease and prolapse is highly desirable when possible. In the pull-through operations it is entirely destroyed.

ISCHIORECTAL SPACE (ISCHIOANAL)

This space is primarily of importance in the etiology of abscess and in treatment of the complex anal fistula.

The pathogenesis of abscess localizing in this space is frequently obscure and somewhat controversial. However, the resultant fistula usually has a horseshoe pattern as emphasized by C. N. Morgan. (Fig. 1.) Regardless of the primary focus, enteric or otherwise, the suppurative process usually spreads rapidly in the loose fatty tissue along the inferomedial aspect of the pubococcygeus and puborectalis muscles to the roof of the ischiorectal space and then behind the anal canal through the posterior communicating or deep postanal space to the opposite side, forming the posterior horseshoe fistula. The main tract usually extends upward parallel to the anal canal to the roof of the

FIG. 1. Pattern of an anorectal fistula (involving both ischiorectal spaces). A, original abscess with extension into the anal canal (B); with extension to the opposite ischiorectal space through the posterior communicating space (C); with extension above the superficial transverse perineal muscle (D). (Redrawn from COURTNEY, H. Anatomy of the pelvic diaphragm and anorectal musculature as related to sphincter preservation in anorectal surgery. *Am. J. Surg.*, 79: 155, 1950.)

space—a very important diagnostic feature. These fistulas are usually of the high anal or anorectal variety in which an internal opening may not be demonstrable and which have a questionable prognosis. They should be carefully studied before surgery. When the internal opening cannot be found, recurrence follows in more than 50 per cent of these fistulas.

Treatment. In the abscess stage adequate drainage of both ischiorectal fossae without division of the anococcygeal ligament which forms the floor of the posterior communicating space, may limit the fistulization to the side originally involved. Since the terminal fistulization is always uncertain regardless of the drainage, it appears preferable in the abscess stage to drain the posterior communicating space by rubber tissue drains passed through it from the lateral incisions rather than dividing

the anococcygeal ligament and exposing the communicating space.

It is commonly observed that the tract through the posterior communicating space persists regardless of whether the anococcygeal ligament was divided or not in draining the abscess, and a horseshoe fistula results. This fistula may be treated by the following methods depending primarily on the location of its internal opening and main tract.

If the primary opening which is usually of the high anal variety is lateral or anterior, the lateral tracts on either side are incised and the incisions carried posteriorly to the lateral margins of the anococcygeal ligament which is left intact. The communicating tract is thoroughly curetted and a drain passed through it to either side. The main tract with the intervening anal musculature may be completely divided; however, it is preferably setonized and subsequently incised in stages. When the internal opening is at or near the posterior midline, which is commonly the case, the following procedure appears preferable.

The lateral incisions are made as heretofore described but the communicating tract is setonized with soft No. 40 suture wire while healing of the lateral tracts continues to a well advanced stage. The communicating tract, the main tract and the anal musculature are then incised and are guttered into a single posterior wound. Additional posterior skin drainage is usually necessary. It may be observed that the level of the internal opening in the anal canal may not be on the same level as the deepest portion of the posterior communicating tract. This is very important.

Finally a one-stage procedure may be done by dividing the main tract, the anal musculature and the lateral and communicating tracts, all saucerized into one large wound. This entails considerable gaping of tissues which is usually followed with some postanal deformity as well as partial incontinence, particularly if the main tract is lateral or anterior. It is, however, the surest method.

Anterior horseshoe fistulas, which are comparatively less common, are treated in a similar manner. However, the increased risk of anal incontinence should be appreciated.

Terminal fistulization of combined space abscesses, supralevator or retrorectal with ischiorectal space, is comparatively rare. In these cases it may be necessary to divide the anococcygeal ligament entirely and remove the coccyx in order to follow out the tracts and secure adequate drainage. Deep postanal deformity may be partially prevented in these cases by reaching the posterior communicating space through an incision directly over the coccyx and reflecting the skin and anococcygeal ligament anteriorly as suggested by Courtney. Adequate drainage, however, is imperative.

SUPRALEVATOR SPACE

The supralevator area is usually loosely referred to as supralevator or deep pelvic and considered as one large space. Actually this extensive space in both sexes is divided into anterior and posterior compartments by the rectovaginal septum in the female and the rectogenital septum in the male. The anterior compartment is the vesicovaginal or vesicoprostatic; the posterior is the rectal compartment in both sexes.

It is of surgical significance to emphasize that the rectal compartment behind the lateral fascial wing of the vagina is the usual location for the supralevator abscess in the female. (Fig. 2.) In the male, however, the common location is the anterior or vesicoprostatic space which is a continuation of the lateral prostatic space. In the male extensions from foci in the deep urethra, prostate and vesicles reach either the anterior or vesicoprostatic compartment of the supralevator space or, more commonly, the ischiorectal space. In the female the corresponding primary foci are higher in the pelvis and extensions commonly reach the posterior or rectal compartment of the supralevator area. This accounts in general for the preponderant 5:1 ratio of the ischiorectal space abscess in the male. There is little doubt that a previous gonorrheal infection, particularly in the male with secondary invaders, produces the primary foci for the majority of these abscesses. With the passing of urethral instrumentation and prostatic massage and the use of the highly effective antibiotics, their incidence will be materially reduced.

However, the precise etiology of these supralevator abscesses is sometimes obscure and debatable except in the known or proven cases of trauma, bone infection, tuberculosis or the granulomas.

The suprelevator spaces are reportedly infected from the anal canal. Cryptitis is com-

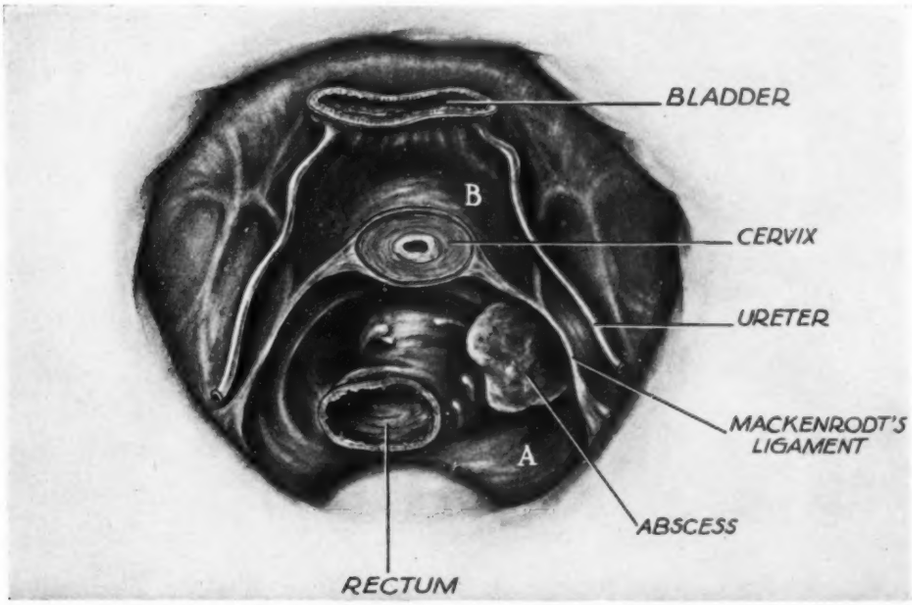

FIG. 2. A, the posterior or rectal compartment of the supralevator space containing an abscess; B, the anterior or vesicovaginal compartment of the supralevator space. In the male the vesicoprostatic space is the usual location of the supralevator abscess.

monly advanced as a cause. However, in our experience and in the vast majority of the reported cases the clinical symptoms of cryptitis are entirely lacking and the pathogenesis is entirely speculative. Infection of the intramuscular glands through the crypts may be of etiologic significance in the infralevator or perianal abscess but rarely so in the supralevator.

Phlegmonous processes or extravasations into the perirectal spaces from urologic trauma or foci may also initially engage the attention of the proctologist. The spread of these infections is not always along conventional fascial planes. Advanced periurethral abscesses from extravasates are sometimes not readily differentiated from anorectal abscesses before operation. Careful investigation, proctologic and urologic, may be necessary to establish the initial focus. In the former instance prompt cystotomy is indicated while in the latter adequate drainage usually suffices.

Abscess of the supralevator spaces should be carefully differentiated from the so-called intramural or submucous abscess which is comparatively rare. The bulging and thinned-out rectal wall in the deeper abscesses is apt to be misleading. The differential diagnosis is significant to the surgical approach which in the latter case is intrarectal.

It may be noted here that rupture of the deep abscesses into the rectum is a severe complication and is apt to lead to the erroneous idea that perineal drainage is not necessary. We consider that wide drainage in all types of supralevator abscesses, including the retrorectal, is imperative. A case in point is that of a thirty-eight year old male with a fistulous tract extending from the perineum to the subperitoneal tissues in the region of the appendix following spontaneous rupture of a pelvic abscess into the rectum. The fistula is incurable.

Drainage of the suprelevator abscess is through the levator ani muscle under guidance of the finger in the rectum. Gentle digital exploration should define the limits of the abscess cavity and involvement of adjacent spaces. The antibiotics although useful are not substitutes for adequate drainage.

RETRORECTAL SPACE

This space is of surgical importance to the proctologist from the standpoint of drainage in abscess and also in separation of the rectum from the sacral wall in the abdominal phase of the abdominoperineal operation. (Fig. 3.)

The space is potentially large. It has strong fascial boundaries: the so-called rectal stalks laterally, and the firm musculofascial levator plate caudally. Cranially, however, its con-

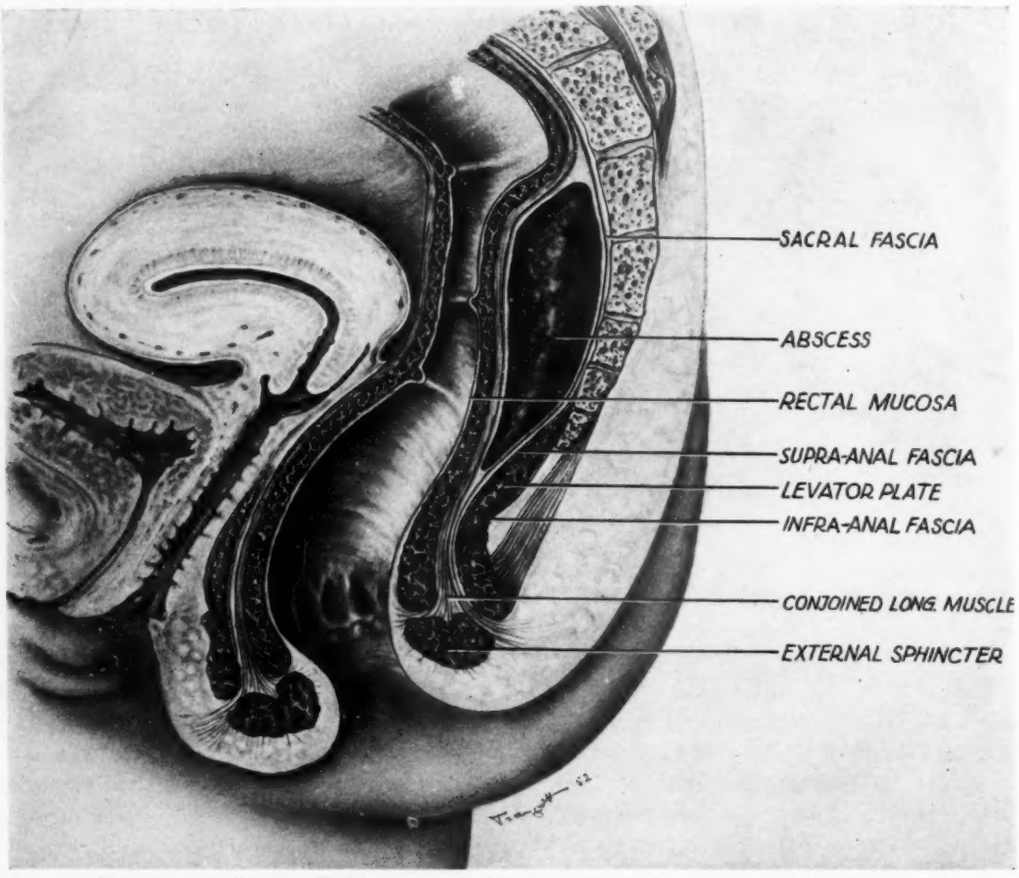

FIG. 3. Retrorectal abscess. This abscess is located above the "levator plate" (anococcygeal muscular raphe) between the rectal wall and the sacral fascia.

tinuation with the retroperitoneal areolar tissue is expansive and free. Drainage of this space is preferably done through a median line incision extending from the posterior margin of the puborectalis muscle to the coccyx, or laterally through Waldeyer's fascia. Incidental removal of the coccyx for more effective drainage may be indicated. Division of the pubococcygeus or iliococcygeus is of less significance than is division of the puborectalis, the key muscle to anal continence.

In the abdominoperineal operations separation of the rectum from the sacrum is preferably done through the cleavage plane behind the posterior leaf of the presacral fascial wing—the fascia propria of the rectum—which contains the main lymphatic branches to the retroperitoneal and mesenteric nodes. It may be noted that this fascial wing contains the pelvic ganglia which have sympathetic and parasympathetic connections and which obviously must be sacrificed with the lymphatics to surgical adequacy.

POSTERIOR LEVATOR SPACE

If abscess in this space is considered a clinical entity, its surgical drainage is essentially the same as described for the retrorectal abscess. It is, however, most important to differentiate an ischiorectal or supralevator space abscess from a posterior levator space abscess which may entail some difficulty.

REFERENCES

ALDEN, C. R. An unusual case of pelvic abscess. *New England J. Med.*, 202: 230, 1930.

COURTNEY, H. Abscesses of the deep perirectal spaces. *New York State J. Med.*, 47: 2552, 1947.

GASTON, E. A. and WARREN, L. O. Supralevator abscess. *New England J. Med.*, 229: 613, 1943.

KRETSCHMER, H. L. Pelvic abscess of prostate. *Surg., Gynec. & Obst.*, 32: 250, 1921.

MORGAN, C. N. The surgical anatomy of the ischiorectal space. *Proc. Roy. Soc. Med.*, 42: 189–200, 1949.

MORRISSEY, J. H. Seminal vesicle and prostatic foci in pelvic, perirectal and ischiorectal suppuration in males. *J. A. M. A.*, 90: 448, 1928.

ROSS, S. T. Abscesses about the anorectum. *Am. J. Surg.*, 59: 536–540, 1943.

Case Reports

SUBARACHNOID HEMORRHAGE COMPLICATING PREGNANCY

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SUBARACHNOID hemorrhage may occur at any age but is perhaps most common in early adult life,[1] so that it may occasionally complicate pregnancy or labor. The symptoms and progress of the condition depend upon the underlying cause, the size of the ruptured vessel and the extent of the bleeding. Generally the symptoms set in acutely and the patient may rapidly go into coma and die in a short time. The blood may, however, seep very slowly from the vessel, producing symptoms of varying intensity over many days or weeks with indefinite or absent neurologic signs,[2] and the symptoms may be confused with other conditions that complicate pregnancy.

When the first hemorrhage from an aneurysm does not kill, the symptoms and focal signs may clear up or greatly improve.[3] Not infrequently there are other attacks, and it is possible that bleeding may be precipitated by effort.[4] Once symptoms from an aneurysm have occurred, the prognosis is grave and the condition, when discovered during pregnancy, should be treated surgically before the onset of labor.

In the subacute cases headache is apt to be the first symptom, and there may be nausea, vomiting, drowsiness and moderate fever. When neck rigidity is associated with the symptoms, the presence of an aneurysm should be suspected;[5] but the diagnosis is generally established by lumbar puncture and located by diodrast injections and arteriograms. Frequently the aneurysm is located in the circle of Willis and produces focal signs of ptosis and ocular palsies, the result of third nerve injury.[6]

CASE REPORT

A twenty-one year old primagravida had last menstruated July 7, 1949. The pregnancy was uneventful and without symptoms until November 26, 1949, when a sudden dizzy spell, followed by pain in the occipital region and loss of consciousness for a few minutes, resulted in a fall with slight head contusions. Nausea and blurring of vision followed the attack.

Complete examination immediately following this incident was essentially negative. The blood pressure was 110/70 and the pulse rate 80. The pupillary reactions were normal and equal, and there was no muscular weakness or abnormal reflexes. There was no nuchal rigidity. The diagnosis of the medical attendant was syncopal reaction and possible mild concussion resulting from the fall.

Pelvic examination on November 27th revealed a nulliparous introitus, a long conical cervix and a gravid uterus consistent in size with a gestation of four and a half months. Fetal movements were perceptible and the fetal heart sounds were audible. There was no edema of the extremities. Laboratory studies of the urine gave negative results. The concentration of the hemoglobin was 12.2 gm. per 100 cc. There had been a 7 pound weight gain during the pregnancy. The blood was of group A, Rh positive.

After two days' bed rest there were recurring headaches and the patient was hospitalized November 30th for observation.

Examination by a neurologic consultant and x-ray of the skull did not reveal any abnormalities, and the patient was discharged in five days without symptoms.

One week following discharge an aching sensation about the left eye was reported and two days later double vision on left lateral gaze was noted. This was followed in one week with ptosis of the left upper eyelid.

On December 24th neurologic examination by a consultant revealed the following: The left pupil was about 4 mm. in diameter and reacted scantily to direct light. There was a

slight droop of the left upper lid to within 1 mm. of the upper border of the pupil; a slight lag of the left eyeball on upward gaze produced double vision. Rapid head movement produced slight but prolonged vertigo. A definite diagnosis was not given.

The patient was admitted to Knickerbocker Hospital on January 4, 1950, for further study. Physical examination revealed no change from those physical findings described by the neurologist.

The specific gravity of a catheterized specimen of urine was 1.009, and tests for albumin and sugar gave negative results. Microscopic examination of the sediment was normal. The erythrocyte count was 3.74 million, the leukocyte count 16,100 per cu. mm. and the concentration of hemoglobin 11 gm. per 100 cc. The erythrocyte sedimentation rate was 50 mm. in one hour, bleeding time one minute and four seconds, and the clotting time three and a half minutes. Roentgenograms of the skull did not reveal any abnormality but those of the chest showed slight fullness of the left border of the heart, suggesting myocardial disease. A lumbar puncture was performed on January 5th. The initial fluid pressure registered 31 mm. water but increased to 80 mm. with carotid pressure. The fluid contained a rare lymphocyte.

The patient was discharged on January 7th, undiagnosed, and felt relatively well except for slight dizziness and pain in the left eye.

On January 14th, while she was riding in an automobile, clonic convulsions suddenly developed and she lapsed into coma.

On admission to the Knickerbocker Hospital she was stuporous, the left eyelid was completely ptosed and the left pupil was fixed in full dilatation. There was sustained knee jerk and ankle jerk clonus bilaterally, and right Babinski reflex. The retinal fundi were reported to be normal. Lumbar puncture revealed the presence of blood and xanthochromia in the cerebrospinal fluid. The diagnosis was now subarachnoid hemorrhage from ruptured aneurysm arising from the intracranial portion of the left internal carotid artery.

On January 19th the patient was transferred to St. Lukes Hospital. The day after admission, under pentothal® anesthesia, an arteriogram was performed. This revealed a large aneurysm, directed posteriorly, arising from the internal carotid artery at the junction of the left posterior communicating artery. On January 21st, under local anesthesia, the left common carotid artery was ligated in the neck. The patient tolerated this well, without any evidence of aphasia or paralysis on the right side.

On January 30th the left internal carotid artery was ligated through a separate incision in the neck, under local anesthesia. She seemed to tolerate this well, also. The next morning, under general intratracheal ether anesthesia, a left frontal craniotomy was performed and the aneurysm was exposed. Two silver clips were placed on the intracranial portion of the internal carotid artery, one just above and one just below the neck of the aneurysm. Convalescence was uneventful. The patient's pregnancy remained undisturbed and she was discharged home on February 10th. The remaining antepartum course was without incident. Except for ptosis of the left lid there were no complaints.

A 7 pound baby girl was delivered by low forceps after an eight-hour labor on March 5, 1950. Both the mother and baby have done well.

Follow-up examination on April 20, 1950, revealed that the ptosis of the left eyelid had largely cleared. There was still some limitation of movement medially, upward and downward of the left eye, and the left pupil remained somewhat dilated. The patient is sometimes bothered by bright lights and occasionally she still wears a patch over the left eye because of diplopia when she reads. She has been able to do all her housework and carries out her normal activities.

COMMENTS

This case is reported to emphasize the insidious nature of these aneurysms and the difficulty in establishing a diagnosis when spinal fluid findings are not diagnostic. This patient was seen by several competent internists and neurologists but a definite diagnosis was not established. It was considered to be a syncopal reaction associated with pregnancy. This case is also unusual in that the patient was able to continue with her pregnancy and go through a normal period of labor, whereas if the aneurysm had not been ligated, she would not only have stood a very good chance of having another intracranial hemorrhage but also there would have been considerable danger of rupturing the aneurysm during the period of labor.

It would appear that the proper method of

dealing with this problem, even in the late months of pregnancy, is to ligate the aneurysm in the same manner as would be done if the patient were not pregnant.

REFERENCES

1. Macdonald, C. A. and Korb, M. Intracranial aneurysms. *Arch. Neurol. & Psychiat.*, 42: 298, 1939.
2. Wechsler, I. S. Textbook of Clinical Neurology, 5th ed. Philadelphia, 1943. W. B. Saunders Co.
3. Parker, H. L. Aneurysm of cerebral vessels. *Arch. Neurol. & Psychiat.*, 16: 728, 1926.
4. Taylor, A. B. and Whitfield, A. G. W. Subarachnoid hemorrhage based on observations of 81 cases. *Quart. J. Med.*, 5: 461, 1936.
5. Meadows, S. F. Intracranial aneurysm, chap. 13. In: Modern Trends in Neurology, edited by Feiling, A., London, 1951. Butterworth & Co.
6. Bull, J. W. D. Diagnostic Neuroradiology, chap. 20. In: Modern Trends in Neurology, edited by Feiling, A. London, 1951. Butterworth & Co., Ltd.

Struma lymphomatosa, as described by Hashimoto, undoubtedly starts as a degeneration of the thyroid cells due to unknown causes. Various forms of treatment have been effective. Biopsy plus x-ray therapy may suffice; but if tracheal compression is a prominent feature, subtotal thyroidectomy or excision of the thyroid isthmus (to decompress the trachea), followed by radiotherapy, becomes indicated. Postoperative thyroid medication by mouth may prevent recurrence of the goiter after surgery. (*Richard A. Leonardo, M.D.*)

MALIGNANT SYMPATHETIC NEUROECTODERMAL TUMOR*

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THE case which forms the basis of this study was briefly reported previously under the diagnosis of malignant paraganglioma.[16] Not all pathologists concede the existence of a malignant variety of paraganglioma. MacKeith[7] in 1944 reviewed the literature and collected sixteen cases of malignant paraganglioma. McGavack[8] having reviewed more critically the same reported cases accepted only eight as definitely malignant paraganglioma. Willis[14] in the 1948 edition of his textbook "Pathology of Tumors" was still more critical. He expressed his sceptical attitude toward the existence of malignant paraganglioma as follows.

"In the majority of cases the chromaffin tumors are benign, growing slowly and neither invading the surrounding parts nor metastasizing. King[3] described a case in which there were bilateral adrenal growths and widespread metastases in other organs; but, although it is possible that King's diagnosis of malignant pheochromocytoma may have been correct, the smallness and bilaterality of the adrenal tumors raise at least the suspicion that they may have been metastases from some undetected primary growth; and he gives no detail of his technique in performing the chromaffin test. None of the few malignant supposedly chromaffin-cell tumors reviewed by Belt and Powell[1] was accompanied by symptoms of hyperadrenalism. Two supposed cases of malignant paraganglioma with metastases reported by Lewis and Geschickter[6] are unacceptable. The reports are scanty and inadequate."

In view of the controversy regarding the existence of malignant paraganglioma and lack of sufficient data upon which a consensus of opinion may be reached it seems worth while to complete the report of the following case. Furthermore the unusual neurosurgical and roentgenologic features in the later stages and the interesting pathologic postmortem findings warrant a full presentation.

A thirty-one year old male veteran entered the Mt. Alto Veterans Hospital on December 9, 1946. Previous history disclosed that the patient had suffered pain in the coccygeal region for about twelve years. He dated his illness to a minor fall which occurred in 1935. The patient claimed to have hurt his sacrococcygeal region at that time. The ensuing sharp pain lasted for about a week and then subsided.

Six months later the patient became conscious of a dull ache in the vicinity of the coccyx, a sensation of fullness in the rectum and a feeling of incomplete evacuation. During the following eleven years he experienced recurring episodes of exacerbation of the foregoing symptoms. These episodes became progressively more severe and occurred at more frequent intervals, so that during his Army service it was necessary for the patient to be placed on the sick list on numerous occasions. It was not until January, 1946, that a digital examination (not previously done) disclosed a hard, fixed mass bulging into the rectum posteriorly. On January 12, 1946, the patient was hospitalized at Bethesda Naval Hospital. The mass was found to extend to the external sphincter below and followed the curve of the sacrum higher than the finger could reach. Proctoscopic examination showed the rectal mucosa to be unbroken and normal in appearance.

At operation on January 18, 1946, the mass completely occluded both ischiorectal fossae. Superiorly the tumor followed the curve of the sacrum for 10 cm. It was freed with difficulty from the surrounding tissues to which it was densely adherent. It was necessary to resect a small portion of the posterior wall of the rectum about an inch and a half above the

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FIG. 1. Admission roentgenograms of the lumbar spine. A, anteroposterior view showing the involvement of left pedicle, adjacent base of the superior articulating process and associated sclerotic bone. B, lateral view depicting a concave depressed area of bone rarefaction on the mid-superior aspect of the body of the third lumbar vertebra. The intervertebral space L2-L3 is narrowed.

external sphincter muscle because the tumor could not be dissected free at that point. The histologic diagnosis was benign paraganglioma. The postoperative course was complicated by a rectal fistula, which healed spontaneously. The patient gained 20 pounds. On May 20, 1946, an acute suppurative pylephlebitis developed. After a stormy course which lasted one and a half months he recovered.

Although upon closer questioning the patient offered the information that he had had pain in the lumbar region previously, it was not until the latter part of November, 1946, that he experienced a sharp pain in the left lumbar region and noted a swelling of the soft tissues on the left side of the lumbar spine, associated with pain in the left leg. Temperature and blood count were normal; erythrocyte sedimentation rate was 35 mm. per hour. Roentgenograms revealed a concave depressed area of bone rarefaction on the mid-superior aspect of the body of the third lumbar vertebra, measuring 11 by 15 mm. (Fig. 1.) Surrounding it was a thin rim of bone condensation 1 mm. in width. The superior aspect of the left pedicle and the adjacent base of the superior articulating process appeared eroded. The left apophyseal joint space was definitely narrowed, as was also the intervertebral space L2-3. The left kidney pelvis and ureter were moderately dilated with a sharp kink at the ureteropelvic junction.

Roentgenologically the aforementioned findings suggested osteomyelitis of the spine (L3), starting subarticularly, most likely of tuberculous etiology. In view of the history of removal of a tumor from the coccygeal region a metastatic lesion was also considered.

Pain, tenderness and swelling rapidly subsided following bed rest and penicillin. However, the pain soon recurred and spread to the left sacroiliac region. Again the patient responded to medication. On March 9, 1947, he experienced severe pain in the right hip and right sacroiliac area, radiating to the right leg. This was accompanied with nausea, vomiting, difficulty in voiding and elevation of temperature.

Examination showed loss of sensation and diminished reflexes bilaterally, more so on the right. Cisternal myelography disclosed a halting of the pantopaque at the lower margin of L2 during the caudad flow and at the interspace L3–4 during the cephalad flow. In the prone position the contrast material passed by the level of L3 in a very narrow trickle just to the right of the midline. In the supine position the pantopaque flowed by more readily. On March 18, 1947, a left L3 laminectomy was performed. No tumor was found

FIG. 2. A, anteroposterior view of lower thoracic spine showing bony sclerosis of the body of T9 with a soft tissue mass on its left side; B, lateral view of T9; C, anteroposterior view of upper thoracic spine, portraying partial destruction of body of T4 with a small soft tissue mass on its left side; D, lateral view of T4 revealing a concave depression on the superior margin of the fourth vertebra and anterior wedging, as well as some narrowing of the intervertebral spaces T4-5 and T5-6.

within the dura, but an apparently encapsulated tumor was noted attached to the paravertebral muscles as they were being retracted laterally. This tumor was easily shelled out but had to be cut away from the nerve root at L3. This was interpreted as representing a dumbbell type of tumor, part of which must have been inside the vertebral foramen prior to retraction. Postoperatively the pain disappeared and sensation returned. The consensus of opinion of the reviewing pathologists was that the mass represented a tumor of neuroectodermal origin and malignant only in the sense of being locally aggressive.

On April 16, 1947, signs of intraspinal tumor developed at the level of T9, associated with paralysis. The body of T9 showed erosion of its superior margin with diminution of its height on the right aspect and obstruction of the pantopaque flow. At operation on April 19, 1947, no intraspinal tumor was seen at T9 but a 1½ inch tumor was found at T6–T7. This extended outward through the foramen and was incompletely excised. Satisfactory improvement followed so that the patient was sent out on leave. On January 6, 1948, he returned with pain and numbness of the legs, and urinary retention. Roentgenograms (Fig. 2) disclosed marked bony sclerosis of the body of L3; moderate sclerosis of T9 with a soft tissue mass (2.7 by 1.5 cm.) on its left side; a concave depression on the superior margin of T4 with anterior wedging; a small paraspinal mass, as well as some narrowing of the intervertebral spaces T4–5 and T5–6. There was marked obstruction to the pantopaque flow at

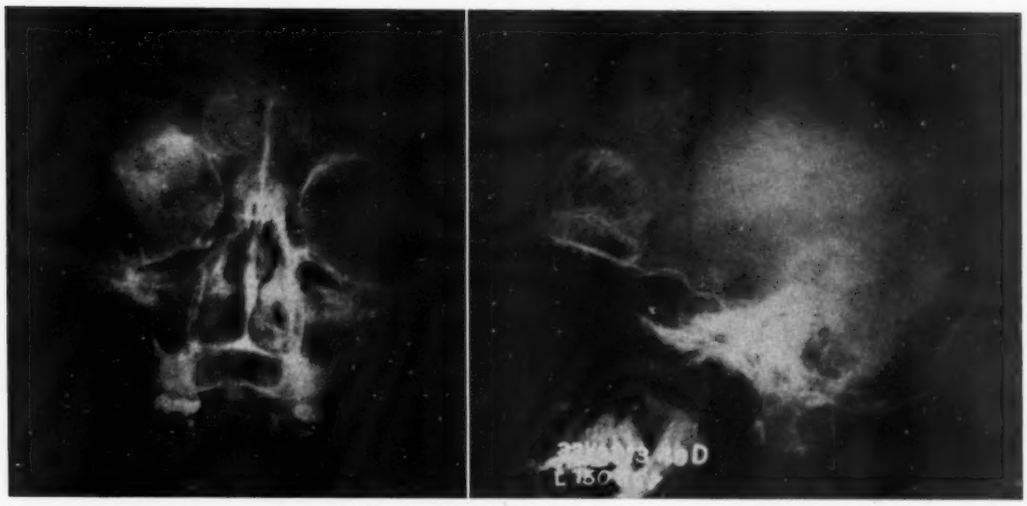


FIG. 3. Roentgenograms of the skull showing a circular area of osseous condensation involving the right frontal bone and roof of the orbit. Note the configuration of radiating bony spicules.

L3 and a rather long, filling defect over L4 and L5. On January 19, 1948, upon exploratory laminectomy it was immediately obvious that the cauda equina was being compressed by a large tumor mass lying anterior to the caudal sac and extending over the dorsal surfaces of the bodies of L3 and L4.

The patient's course was gradually downhill. New masses appeared in the left paraspinal region at the angle of the twelfth rib, in the buttocks and in the abdominal wall. The patient was still semi-ambulant until August, 1948, when complete paralysis of the lower extremities ensued with general and gradual atrophy of the lower half of the body. On December 14, 1948, exophthalmos of the right eye with associated diplopia was noted. Roentgenograms on January 13, 1949, revealed a circular area of osseous condensation about 4.5 cm. in diameter involving the right frontal bone and roof of the orbit. It had the configuration of spicules radiating in upward and downward directions from the floor of the right anterior fossa. (Fig. 3.) Many large bladder calculi necessitated permanent suprapubic cystostomy. (Fig. 4.) The last antemortem and the postmortem (Fig. 5) roentgenograms depicted the marked destruction and dissolution of the bodies of T6 and 8. The bodies of T3, 4 and 9, the sacrum and innominate bones showed a combination of osteoporosis and osteosclerosis. Some bony condensation was present in the bodies of T7, T12, L1 and L2. The body of L3 was extremely dense with an

FIG. 4. Terminal antemortem roentgenogram depicting the densely sclerotic bodies of T12 to L3. The large urinary bladder calculi are discernible.

increase of 1.5 cm. in its transverse diameter. The patient expired on May 15, 1949.

Autopsy revealed the body of a markedly emaciated white adult male weighing about 85 pounds. The following positive findings were noted: several slightly enlarged, rubbery mobile lymph nodes in the left side of the neck, 1 by 1 by ½ cm. each. Two masses of similar size

5A 5B

FIG. 5. Postmortem roentgenograms. A, reveals the eburnation of the bodies of T12 to L3 as contrasted with the osteoporotic destruction of the bodies of T6 and T8. B, overpenetrated roentgenogram portraying the increase in diameter of the dense, ivory-like body of L3; it also shows the combination of osteoporosis and osteosclerosis involving the sacrum and innominate bones.

were located in the dermis of the right side of the abdomen.

The left lobe of the thyroid was markedly enlarged, containing a freely mobile, firm, irregular nodular tumor, 3 by 4 by 2 cm. Section showed the thyroid parenchyma almost completely replaced by a granular, pinkish white tumor tissue. Along the lateral border was a fairly well delineated, 1 by 0.8 cm. area of dense, white tissue containing several confluent islands of yellow tissue. The right lobe of the thyroid was of normal size. Near the lower pole was a 3 mm. well defined, dense, white tumor nodule.

One parathyroid at the left lobe of thyroid was enlarged and almost completely replaced by neoplastic tissue.

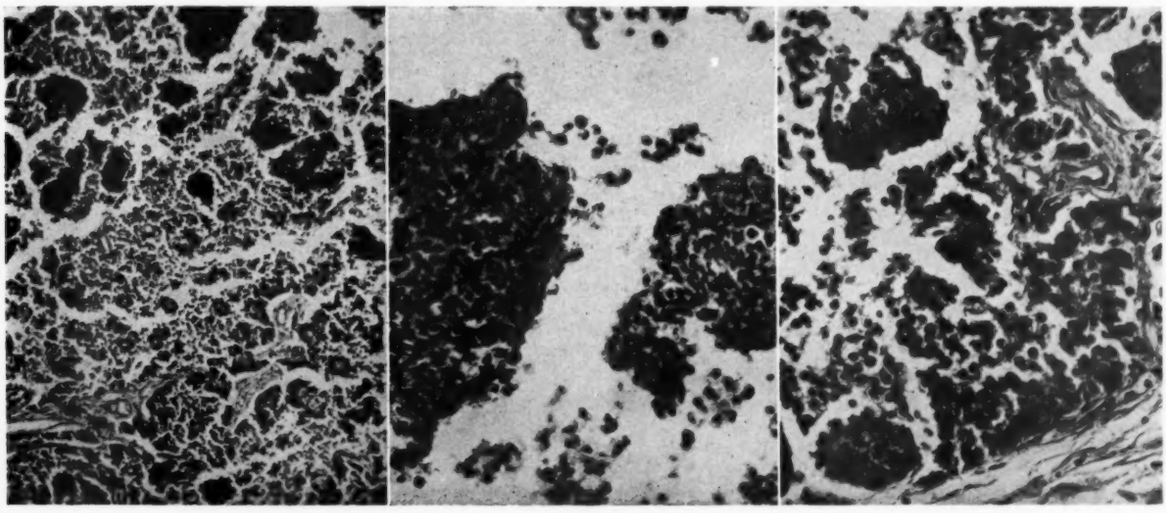
There were several small tumor nodules, 1 to 10 mm. over the epicardium. Similar neoplastic tissue were seen on endocardium of all chambers except the left auricle. The one in the right auricle was the largest (2 cm.) and projected forward into the cavity from the medial wall of auricle. It was covered by intact intima which was partly calcified. There were a few areas of nodular thickening along the line of closure of the mitral valve, up to 5 mm. Section through anterior descending and circumflex branches of left coronary artery showed marked partially calcified thickening of the walls. Right coronary artery had similar thickenings. There were a few nodules of neoplastic tissue in the musculature of the left ventricle. The aorta had several small yellowish plaques, some partly calcified.

An occasional small, well defined white tumor nodule, 2½ by 2 cm., was found in the right lung. Careful dissection of the bronchial tree revealed a small 2 mm. nodular area of thickening of the wall, with elevation of the grossly and histologically intact mucosa in a tertiary bronchus of the right upper lobe.

Combined weight of the adrenals was 15 gm. In the medulla of the left adrenal there was a small spherical grayish white area of neoplastic tissue, 2 mm. in size. It invaded and partly replaced the cortex. Occasional tumor nodules, 3 by 2 by 1 mm. were seen in periadrenal fat.

The left kidney was large weighing 195 gm.; 2 to 5 mm. nodules were found in the cortex, bilaterally. There were several concretions in the pelves. Some concrement was occluding the ureters, 14 cm. below the pelvis on the right and 3 cm. on the left. The left ureter was narrowed by a neoplastic mass 3.5 cm. in diameter just before it entered the bladder.

Many nodules were seen in and just beneath the gastric mucosa, 5 to 7 mm. The mucosa



6A 6B 6C

FIG. 6. Photomicrographs illustrating pattern 1. A, × 100. B, × 400; higher magnification of two of the cell sheets of the upper part of (A); the tumor cells have indistinct borders with hyperchromatic nuclei. C, × 350; the tendency toward pallisading of the peripheral layer of a cell group and the rosette-like or acinar-like formations are well depicted in this illustration.

was intact. The rectum was firmly adherent to an ill defined, extremely firm tumor located posteriorly and somewhat to the left and adherent to the sacrum. This mass, 5 by 5 by 3 cm., invaded and replaced the muscles of the lateral pelvic wall. The rectal wall just above the mucocutaneous junction was somewhat indurated and firmly adherent to underlying neoplastic tissue. It showed a cleft-like depression at one point.

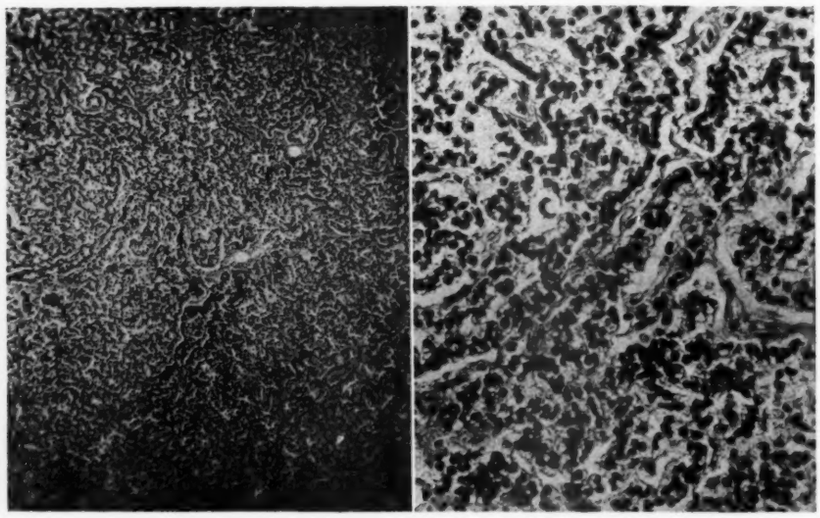
The liver was enlarged, weighing 3,120 gm. There were many large necrotic areas of tumor, the largest being 8 by 6 by 7 cm. The left lobe was practically replaced by a 12 by 5 by 9 cm. necrotic tumor.

The pancreas was extensively involved throughout with ill defined, yellowish white neoplastic tissue. There was obliteration of the pancreatic duct and narrowing of the common bile duct.

The spleen was enlarged, weighing 300 gm. All lymph nodes, superficial as well as deep, were involved.

Bodies of sacral, lumbar and most of lower thoracic vertebrae were extensively invaded by neoplastic tissue. The third lumbar was almost of ivory appearance; the other lumbar vertebrae showed a less marked sclerotic change. Sternal marrow presented occasional tumor nodules. The spinal canal in the thoracic, lumbar and sacral regions was occupied by pinkish white, partly necrotic tumor tissue which compressed the spinal cord and cauda equina. The inner table of skull in the right parietal region was elevated and considerably thinned by a neoplastic, hemispherical mass, 3 by 3 by ½ cm. A similar mass, 4 by 3 by 3 cm., was located in right anterior fossa involving the orbital plate and adjacent frontal bone. The mid-portion of the right femoral shaft was invaded by tumor.

Microscopically, two main histologic patterns were found. The tumor cells in pattern 1 were relatively small, round to polyhedral in shape, with a moderate amount of finely granular cytoplasm, usually with indistinct cell borders. (Fig. 6.) The nuclei of the cells were round to oval, finely chromatic, some of them possessing a single, small eosinophilic nucleolus. Some of the cells were elongated and possessed small hyperchromatic nucleoli. No mitotic figures were seen but there were infrequent multinucleated cells. Some of the nuclei were large and bizarre with prominent nucleoli. The peripheral layer of cells in each group was frequently palisaded in appearance because of the columnar shape of these cells. In the interior of the cell sheets there were rather frequent small rosette-like or acinar-like groups of prismatic tumor cells arranged about a small central pore or vacuole, which was sometimes filled with a homogeneous colloid-like substance. Even more commonly pseudorosettes were formed about the vascular capillaries



7A 7B

FIG. 7. Photomicrographs illustrating pattern II. A, × 100. B, × 400. The cells are columnar in shape with distinct borders, relatively abundant finely vacuolated cytoplasm and small chromatic nuclei. They are arranged in narrow interlacing cords, one-cell thick.

within the supporting stroma. The cells of pattern II were columnar in shape with distinct cell borders, relatively abundant, finely vacuolated cytoplasm and small chromatic nuclei located near the vascular pole. (Fig. 7.) The cells were arranged in narrow interlacing cords, one-cell thick. The histologic pattern of this tumor was strikingly well maintained throughout the course of this patient, including the original removed retrorectal mass and the subsequent paraspinal and cutaneous masses. Pattern I was the predominating type. The Fontana stains did not reveal any argentaffin granules in the tumor cells. A Masson trichrome stain failed to show any fuchsinophil granules. No obvious neurofibrils were observed in the sections stained with Davenport stain. However, the pathologist specializing in nervous tissue histology was able to demonstrate neurofibrils springing from tumor cells, thus indicating the neuroectodermal nature of the neoplasm.

COMMENTS

Until recently tumors of the carotid body, of the anococcygeal body and carcinoids were included in the term paraganglioma. At present it is the consensus of opinion among pathologists to exclude the foregoing tumors from the chromaffin system tumors. In a recent article Brines and Jennings[2] have summarized the reasons for such exclusion.

"Because of the inconstancy of presence of chromaffin cells, because epinephrine has never been demonstrated and because of the difference in embryologic development (mesenchymal origin from wall of 3rd branchial cleft) these authors will not consider tumors derived from carotid body as paraganglioma." They prefer not to include argentaffin tumors (carcinoids) because "they are derived from entodermal origin, often contain lipoid substances (not seen in paraganglioma) and no epinephrine-like substances." Similarly they exclude coccygeal body tumors "because it has nothing in common embryologically with paraganglion cells." By a process of maturation and differentiation ganglion cells of the sympathetic system, paraganglion cells and the sheath cells (Schwann or neurilemma cells) are derived from the cells of the neural crest. The cells destined to become paraganglion cells migrate to the dorsal surface of the sympathetic ganglia to form small, rounded masses in depressions of these ganglia. Because of this close association the term paraganglion has been applied. Similar masses occur in the sympathetic plexuses, the best known of which are the organs of Zuckerkandl which develop along the aorta near the root of the inferior mesenteric artery. Similar collections of these cells have been described in the liver, testes, kidneys and heart.

The name pheochromocytoma is commonly

employed to designate those tumors arising from the chromaffin cells in the adrenal medulla. The term paraganglioma is applied to the tumors arising from cells of the chromaffin system located outside the adrenal. However, there is no valid reason for such different designations just on the basis of location. The vast majority of such tumors arise within the adrenal medulla or in the adjacent medial retroperitoneal tissue.

Microscopically the paragangliomas in their typical form show a general resemblance to adrenal medullary tissue, consisting of noncompact groups of polygonal or irregular cells with intervening vascular channels. The peripheral layer of the cells in each group is at times palisaded with more or less frequent small rosette-like or acinar-like configurations in the interior of the cell sheets. The cells have abundant cytoplasm. The cell boundaries are often indefinite exhibiting a tendency toward syncytial forms. The nuclei are large, vesicular and frequently have prominent nucleoli. Mitotic figures are usually scanty. However, there is often much variation in size, shape and arrangement of the cells. An entirely different histologic pattern is met with at times. Some tumors may be composed of small fusiform cells with dark pyknotic nuclei and no demonstrable nucleoli. The histologic appearance may closely approach that of carcinoid. In fact in our case for a while one pathologist entertained the tentative diagnosis of carcinoid. However, as will be discussed later, the clinical, roentgenologic and postmortem findings were against such a diagnosis.

Occasionally paraganglioma tissue may be found as an admixture with a neuroblastoma or ganglioneuroma. Wahl and Robinson[13] reported such a case in which the tumor was made up of a widely diverse assortment of cells of sympathetic origin in all stages of differentiation from sympathogonia to adult ganglion cells and adult sympathetic trunk. "Differentiation was shown chiefly toward paraganglionic cells rather than toward neuroblasts, but in different sections either of these two cell types might be seen to be predominant. Transitions could be seen between the primitive nerve cells and the chromaffin cells, like those of the adrenal medulla." Lewis and Geschickter[6] in their discussion of tumors of the sympathetic system concluded that "the three types of tumors, neuroblastoma, ganglioneuroma and paraganglioma, develop from cells which wander out from the neural crest during embryonic life." The undifferentiated cell may give rise to the neuroblastoma; and as differentiation proceeds the more adult types of paraganglioma and ganglioneuroma may develop. The occurrence of all these types of tissue in the same tumor indicates a common origin, different degrees of differentiation accounting for the occurrence of the more adult type of tissue.

It is because of the possibility of variation of the degree of differentiation that Stout[12] cautioned against accepting the generalization that ganglioneuromas are benign. "Like many other generalizations this is not exact and when it can be shown that 19 or possibly 20 tumors (out of 243 reviewed cases) classified as ganglioneuromas have metastasized it will be realized that further elucidation is necessary." Of 199 cases of ganglioneuroma which he was able to analyze he found 146 fully differentiated without any metastases; thirty-three cases having diffusely scattered cells of a lesser degree of differentiation with six patients exhibiting metastases; and twenty cases having neuroblastoma admixtures, of which thirteen developed metastases. Upon this basis Stout justly made the plea for more follow-up data, since the literature contained information on only six cases which had been followed more than three years and on four more in which the tumor was known to have been in existence for more than three years without removal.

Our case presented two main histologic patterns, both of which have been previously described in the literature on paraganglioma. The original specimen removed from the retrorectal region was diagnosed as benign paraganglioma without any qualification. The majority opinion of several reviewing pathologists was that the original retrorectal tumor and the subsequently removed tumors at L3 and T6 were independent growths of neuroectodermal origin and malignant only in the sense of being locally aggressive. The roentgenologic findings and subsequent course proved these to be unqualifiedly malignant and not to represent independent growths. The roentgenograms clearly showed involvement of the vertebral bodies L3 and T9 prior to the first two laminectomies. Although multicentric neuroectodermal tumors are met with relatively frequently, the findings in this case are more

in accord with a single primary focus and widespread metastases. Most probably both nerves and bone at any one spinal level were involved simultaneously by metastasis via Batson's vertebral venous circulation. After a metastatic focus had established itself intravertebrally or paravertebrally some extension along the nerve roots may have taken place via the perineural lymphatics. The limited view from the posterior aspect obtained during the laminectomy procedures prevented the neurosurgeon from adequate exploration of the tumor, which at that time was undoubtedly already present on the anterior aspects of the paraspinal muscles and in the adjacent vertebral bodies.

Brines and Jennings[2] in 1948 found that all thirty cases of benign paraganglioma which were reported in the previous four years were characterized by symptoms of epinephrine production. This adrenal sympathetic syndrome consists of paroxysmal hypertension, pallor, cold clammy extremities, palpitation and severe headaches. Although MacKeith stated that some malignant paragangliomas may show a hypertensive picture, none of McGavack's eight more critically selected malignant cases was hormonally active. At no time did our patient exhibit an elevated blood pressure or episodes of the adrenal sympathetic syndrome. The many recorded blood pressures were in the low normal range.

The chromaffin reaction is now known to be non-specific. The cells from the primary retrorectal tumor were originally interpreted as showing an affinity for potassium bichromate. However, the final report was that the Zenker-fixed material did not show the tumor to be chromaffin positive. Review of the original slide confirms this conclusion. A close parallelism may be found in King's case[3] in which the original adrenal tumor allegedly showed cells which took the chromaffin reaction but later the metastatic growths did not show this reaction, with the exception of a few scattered cells. Until more such cases have accumulated and the potentiality for malignancy of paraganglioma has been confirmed, it seems preferable to use the non-committal term of malignant sympathetic neuroectodermal derivative tumor. This may include admixtures of paraganglioma and neuroblastoma elements.

Roentgenologically the case was ushered in a most puzzling manner and then eventuated into the most typical manifestations of metastases from a tumor of sympathetic neuroectodermal derivation, namely neuroblastoma. The earliest stage of involvement of the third lumbar vertebra expressed itself in a most unorthodox manner, suggesting tuberculosis of the spine. The associated narrowing of the left posterior apophyseal joint space and of the proximal intervertebral space L2–3 is a feature commonly found in inflammatory processes. An obverse example in which a unilateral tuberculous abscess roentgenographically resembled a neuroectodermal tumor (dumbbell neurofibroma) was recently reported by Kneidel, Smith and Bishop.[4]

Juxta-articular osseous metastases typically do not invade the cartilage. Therefore the roentgenograms usually depict the joint space intact. The narrowing of the intervertebral space L2–3 in our case, and the later similar narrowing of T4–5 and T5–6 may have been predicated upon pressure erosion of the adjacent hyaline cartilage plate portion of the disc. Eventually this may have resulted in the release of the nucleus pulposus from the confinement by the hyaline cartilage and annulus fibrosus. Roentgenologically the neoplastic nature of the process is evidenced by the fact that the narrowing of the intervertebral space L2–3 did not progress even in the late stages (Fig. 5) when the metastatic mass was large and had extended into the soft tissue surrounding the intervertebral disc.

Osteolytic and marked degrees of osteoblastic metastases are commonly found in malignant neuroectodermal tumors. Wyatt and Farber[15] found combined bone destruction and proliferation present in the majority of the osseous lesions in forty cases of neuroblastoma sympatheticum. They used the latter term to denote the malignant members of the series of tumors arising in the sympathetic nervous system. Bone proliferation was a prominent feature in the metastases to the spine and pelvis, in some instances simulating Paget's disease. In their series the lesions in the skull, ribs and shafts of the long bones were predominantly destructive in type, and "no instance of the commonly described spicule formation at right angles to the shaft was found." The extremely dense ivory-like third lumbar vertebra with its increase in volume in our patient was in accord with the findings

of the aforementioned authors. The involvement of the fronto-orbital area of the skull by osteoblastic deposit with the ray-like configuration again speaks for a neuroectodermal derivative tumor.

These roentgenologic findings militate against the diagnosis of carcinoid which was at one time entertained by one pathologist. Bone metastases are rare even in metastasizing carcinoid. Only three of thirty-nine metastasizing cases of carcinoid reviewed by Pearson and Fitzgerald[9] exhibited osseous involvement. Reference to these three reports discloses that one[5] consisted of contiguous involvement of the pelvis from a rectal carcinoid. The second report[11] concerns the findings of a small metastatic nodule in the third lumbar and tenth thoracic vertebrae in the presence of a mass the size of a man's hand in the upper mid-abdomen and widespread visceral metastases. The rectum was the primary site of the carcinoid. No roentgenograms are exhibited. The third report[10] deals with a carcinoid of the ileum and appendix with widespread visceral metastases, in which mention is made that microscopically there were several small clumps of tumor cells in the bone marrow of a lumbar vertebra. This patient had a barium enema examination but there is no mention of any roentgenographic signs of spine metastases. Evidently in no one of the previously cited three cases of metastasizing carcinoid was there exhibited the degree of osteoblastic metastases or the extent of bone involvement which was manifested in our patient. On the other hand osseous metastases are common in malignant sympathetic neuroectodermal derivative tumors.

The final episode of marked urinary lithiasis (Fig. 4) is commonly found in paralyzed patients and may be especially pronounced when paralysis is associated with widespread bone destruction by metastatic malignancy.

SUMMARY

A case of malignant sympathetic neuroectodermal derivative tumor is presented and the following features are discussed.

1. Early in the patient's course on the basis of an initial positive interpretation of the bichromate reaction and the histologic picture a diagnosis of benign paraganglioma was made. The final report (confirmed by review) that the original tissue did not exhibit a positive chromaffin reaction and the later course—including widespread osseous involvement, cranial metastases in the shape of radiating osteoblastic spicules and the absence of the sympathetic syndrome—are more in accord with the diagnosis of neuroblastoma.

2. An unusually long period elapsed before the organic basis for the patient's symptoms was located. The patient had complained of a dull ache in the coccygeal region, a sensation of fullness in the rectum and a feeling of incomplete evacuation for over ten years before a digital examination was done and the retrorectal mass was discovered.

3. The histologic picture was of such benign nature that even when presented with three distinct specimens from widely separated sites the reviewing pathologists still did not diagnose them as malignant metastases but opined that "these were independent growths of neuroectodermal origin and malignant only in the sense of being locally aggressive." Not until the autopsy material was studied were the infrequent multinucleated cells seen, the histologic indications of malignancy. Two main histologic patterns were encountered in the several surgical specimens and the postmortem material.

4. The earliest roentgenologic manifestations resembled tuberculous involvement of a lumbar vertebra with some narrowing of the proximal intervertebral space and left posterior apophyseal joint space. The later metastases consisted of osteolytic and osteoblastic deposits with a dense ivory-like third lumbar vertebra and a typical circular ray-like configuration of dense spicules at the fronto-orbital region of the skull.

5. The conflicting attitudes toward the existence and frequency of malignant paraganglioma warrant a plea for full data follow-up reports on all three varieties of tumor of the sympathetic nervous system. The degree of admixture of neuroblastoma, paraganglioma and ganglioneuroma elements, as well as the potentiality for malignancy of the latter two tumors, still remains to be established. We, therefore, chose the non-committal term of malignant sympathetic neuroectodermal tumor until a sufficient number of cases like King's and ours will have accumulated so that the admixture or eventuation of paraganglioma into neuroblastoma might be decided upon.

REFERENCES

1. Belt, A. E. and Powell, T. O. Clinical manifestations of the chromaffin cell tumors arising from the suprarenal medulla. *Surg., Gynec. & Obst.*, 59: 9–24, 1934.
2. Brines, O. A. and Jennings, E. R. Paraganglioma. Review of subject and report of five original cases. *Am. J. Path.*, 24: 1168–1198, 1948.
3. King, E. S. J. Malignant pheochromocytoma of the adrenals. *J. Path. & Bact.*, 34: 447–452, 1931.
4. Kneidel, J. H., Smith, L. A. and Bishop, R. E. Unilateral tuberculous abscess of the thoracic spine with roentgen findings of a dumb-bell neurofibroma. *Radiology*, 54: 78–81, 1950.
5. Koch, F. Malignant carcinoid. *Chirurg*, 12: 270–275, 1940.
6. Lewis, D. and Geschickter, C. Tumors of the sympathetic nervous system. *Arch. Surg.*, 28: 16–58, 1934.
7. MacKeith, R. Adrenal sympathetic syndrome. Chromaffin tissue tumor with paroxysmal hypertension. *Brit. Heart J.*, 6: 1–12, 1944.
8. McGavack, T. H., Benjamin, J. W., Speer, F. D. and Klotz, S. Malignant pheochromocytoma of adrenal medulla (paraganglioma). *J. Clin. Endocrinol.*, 2: 332–338, 1942.
9. Pearson, C. M. and Fitzgerald, P. J. Carcinoid tumors. *Cancer*, 2: 1005–1026, 1949; Carcinoid tumors of the rectum. *Ann. Surg.*, 128: 128–143, 1948.
10. Porter, J. E. and Whelan, C. S. Argentaffin tumors. *Am. J. Cancer*, 36: 343–358, 1939.
11. Siburg, F. Case of so-called carcinoid of rectum with widespread metastases. *Frankfurt. Ztscb. f. Path.*, 37: 254–269, 1929.
12. Stout, A. P. Ganglioneuroma of the sympathetic nervous system. *Surg., Gynec. & Obst.*, 84: 101–110, 1947.
13. Wahl, H. R. and Robinson, D. Neuroblastoma of the mediastinum with pheochromoblastomatous elements. *Arch. Path.*, 35: 571–578, 1943.
14. Willis, R. A. Pathology of Tumors, p. 873, St. Louis, Mo., 1948. C. V. Mosby Co.
15. Wyatt, G. M. and Farber, S. Neuroblastoma sympatheticum. *Am. J. Roentgenol.*, 46: 485–496, 1941.
16. Young, V. T. Retrorectal paraganglioma with metastatis. *Am. J. Surg.*, 76: 748–749, 1948.

ASSOCIATION OF BLEEDING AND PERFORATION IN PEPTIC ULCERS

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WINTERS and Egan[1] found bleeding and perforation in 1 per cent of all patients with peptic ulcers admitted to Cook County Hospital in a four-year period. Bleeding was present in 10 per cent of their cases of perforation. This figure is impressive as it is usually taught that bleeding and perforation are rarely present together in peptic ulcers. A much used medical axiom has been: "Bleeding peptic ulcers do not perforate, and perforating peptic ulcers do not bleed." The virtual simultaneous occurrence of bleeding and perforation in peptic ulcers encountered in private practice, on a statistical basis, would be infrequent. However, it may occur occasionally and attention should be given to this. We have recently encountered such a case.

CASE REPORT

J. U., a white married farmer, was admitted to the Arkansas Baptist Hospital on December 10, 1951, with the chief complaint of pain in the abdomen of twelve hours' duration.

The patient stated that for several years he had had burning and epigastric discomfort whenever he was hungry. This was associated with frequent episodes of pain during the night. Pain was invariably worse between meals, when he was hungry, and was always relieved by food and antacids. He was unable to eat highly seasoned foods or roughage because of the marked increase in abdominal discomfort which resulted. Prior to the present episode the patient denied vomiting, having tarry stools or marked severity of pain. Approximately twelve hours prior to the original hospital admission the patient began having an acute burning epigastric pain. This gradually became worse and within a matter of an hour or so the pain became overwhelmingly severe. A physician was immediately called and a diagnosis of perforated duodenal ulcer was made. The patient was referred to the Arkansas Baptist Hospital.

Past and family histories were non-contributory. Except for the fact that the patient's senses of vision and hearing were considerably decreased, he denied all symptoms referable to systems other than his gastrointestinal tract.

On physical examination the patient weighed 135 pounds and was 5 feet, 10 inches in height. The blood pressure was 142/84, pulse 110 and respiration 22. The patient was a thin, alert, well developed elderly man who was in apparent extreme pain. The pupils reacted to light and accommodation. There was complete edentia. The neck was supple. There was no lymphadenopathy. The heart sounds were of good quality and the rhythm was regular. The lungs were clear to auscultation. There was generalized abdominal tenderness which was maximum in the epigastrium; there was muscular rigidity throughout the entire abdomen, with very marked rebound tenderness referred to the epigastrium. A left indirect inguinal hernia was found. Rectal examination was negative. The red blood count was 4,590,000 and the white blood count 8,000. Hemoglobin was 71 per cent, segmented neutrophils 83, stab forms 4, eosinophils 1, lymphocytes 7, monocytes 5, myelocytes 0, basophils 0 and juvenile neutrophils 0. The urine was amber colored, with an acid reaction. Specific gravity was 1.018; there was no albumin or sugar. Numerous bacteria and a few epithelial cells were seen in the spun urinary sediment.

As soon as the patient could be prepared for surgery, he was explored by one of us (F. G. K.). A large perforated duodenal ulcer of the first portion of the duodenum was found, which was situated along the anterior-superior wall and extended into the lesser curvature of the duodenal loop. The ulcer was closed and the patient made an excellent recovery.

He was discharged from the hospital on December 18, 1951, but on January 11, 1952, was again admitted with the chief complaint of bloody vomitus and stool of twelve hours' duration. He stated that he had gotten along very well after leaving the hospital until twelve

hours previously. At that time he had a massive hemorrhage which was followed by several subsequent ones. The hemorrhage was of sufficiently large quantity to cause the patient to faint. He was readmitted to the hospital and after extensive transfusion was re-explored. At surgery on January 15th the patient was found to be bleeding from a duodenal ulcer on the inferior-posterior aspect of the duodenum, perforated on the pancreas. Because of this an extensive gastric resection was performed. The patient made an excellent recovery and was discharged from the hospital January 23, 1952.

COMMENTS

Ives[2] has recently discussed some of the reasons for the comparative rarity of the association of bleeding and perforation in peptic ulcers. It has been suggested that ulcers which penetrate posteriorly are statistically more prone to encounter large vessels. On the other hand, the posterior wall of the stomach and duodenum being in opposition to the structures of the posterior parietes, ulcers of this area, if they penetrate, simply continue their course into the underlying viscus; the inflammatory reaction seals off the ulcer so that the burrow does not have communication with the peritoneal cavity. Anterior penetrating ulcers do not have any closely overlying organs and the ulcer crater erodes into the peritoneal cavity. There are few big blood vessels in proximity to the anterior surface of the stomach or duodenum; thus serious bleeding would be less likely to occur. It was concluded that for simultaneous bleeding and perforation to occur the ulcer had to be large enough to involve both the anterior and posterior surfaces or else two ulcers existed.

Slater has had six recent cases, three of which have been reported.[3,4] His cases are of interest in two respects: First, one of his patients had unsuspected multiple peptic ulcers; second, in two cases a gastric ulcer was not detectable by external examination of the stomach. The finding of an obvious peptic ulcer should not deter the surgeon from looking for a second ulcer if the appearance of the lesion does not seem to explain the source of the bleeding. The percentage of undiagnosed cases of bleeding even after laparotomy is formidable; Jankelson and Milner did not discover the source of the bleeding in three undiagnosed cases in their series despite a total of six laparotomies.[5]

Eliason and Ebeling reported that there was simultaneous hemorrhage and perforation in four of their series.[6] The literature prior to their article is well reviewed. In an excellent though brief discussion of this problem Gordon-Taylor[7] lists three times relationships of the two complications and gives his experience in treatment: simultaneous hemorrhage and perforation, nine patients were operated upon with recovery of six; cases of hemorrhage followed with perforation, three patients were operated upon and all died; perforation followed by hemorrhage, five operations and five deaths.

Ladin[8] recently reported three cases. One patient with simultaneous hemorrhage and perforation died; two patients with hemorrhage after perforation recovered.

In summary, it is obvious that the axiom of bleeding ulcers not perforating and vice versa is not true. Despite the statistical infrequency of this combination, it does occur and should be considered as a diagnostic possibility if the sign and symptoms seem to warrant it.

CONCLUSIONS

1. A case of peptic ulcer in which two major complications, hemorrhage and perforation, occurred is reported. Its incidence is discussed.
2. Two points of special interest are emphasized, namely, the possibility of multiple simultaneous peptic ulcers and the necessity of opening the stomach to find the bleeding ulcer when there are no obvious signs on the exterior of the stomach.

REFERENCES

1. Winters, W. L. and Egan, S. Incidence of hemorrhage occurring with perforation in peptic ulcer. *J. A. M. A.*, 113: 2199, 1939.
2. Ives, L. A. Perforation and hematemesis. *Lancet*, 1: 246, 1950.
3. Slater, W. S. Associated perforation and hemorrhage in peptic ulcers. *Brit. M. J.*, 2: 1257, 1951.
4. Slater, W. S. Personal communication.
5. Jankelson, I. R. and Milner, L. R. Massive upper digestive tract hemorrhage of undetermined origin. *J. A. M. A.*, 145: 17, 1952.
6. Eliason, E. L. and Ebeling, W. W. Catastrophes of peptic ulcer. *Am. J. Surg.*, 24: 63, 1934.
7. Gordon-Taylor, G. The problem of the bleeding peptic ulcer. *Brit. J. Surg.*, 25: 403, 1937–1938.
8. Ladin, P. Massive hemorrhage complicating perforated peptic ulcer. *New York State J. Med.*, 50: 1491, 1950.

CAROTID BODY TUMOR*

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ALTHOUGH there have been more than 300 carotid body tumors reported, a case report stressing the difficulty of preoperative diagnosis, lack of symptoms and aberrant site may be worth while.

A review of the recent literature revealed that the carotid body tumor is of unknown etiology, occasionally familial, and apparently a hyperplasia of the normal structure.[1] Occasionally malignancy occurs and very rarely with a distant metastasis.[2]

The carotid body is located behind the bifurcation of the common carotid artery. (Fig. 1.) There is no agreement on the embryologic derivation of this structure. Some reports state that it is derived from the neural tube as primitive cells of the sympathetic system with migration eventually to the carotid bifurcation; others emphasize the carotid body origin from a complex mesodermal condensation of the third branchial arch;[1,3] still others report it as occurring in aberrant sites such as the middle ear, about the mastoid process, and even in the abdomen.[1]

Grossly, the normal carotid body approximates a grain of rice in size. The nutrient vessels arise either from the internal or external carotid arteries. The nerve supply is a composite of the 9th, 10th and 12th cranial nerves as well as a branch from the superior cervical sympathetic ganglion. Microscopically the structure is surrounded by a fibrous capsule which sends septa carrying the vessels and nerves into the parenchyma. The parenchymal cells are described either as cuboidal or polyhedral. The nuclei are often eccentrically situated in the cytoplasm.[1]

Although the carotid body is reported to be sensitive to pH changes and the tensions of carbon dioxide and oxygen in the circulation, there has never been any disturbance directly related to the removal of the hyperplastic carotid body *per se*.[1,2] A recent article cited a patient who had bilateral carotid body tumors which were removed without any disturbances evidenced in the postoperative course.[1]

Generally, carotid tumors are not preoperatively suspected. The diagnosis, therefore, should be considered with any slow-growing, firm, non-tender neck tumor located in the superior aspect of the anterior cervical triangle and partially obscured by the overlying

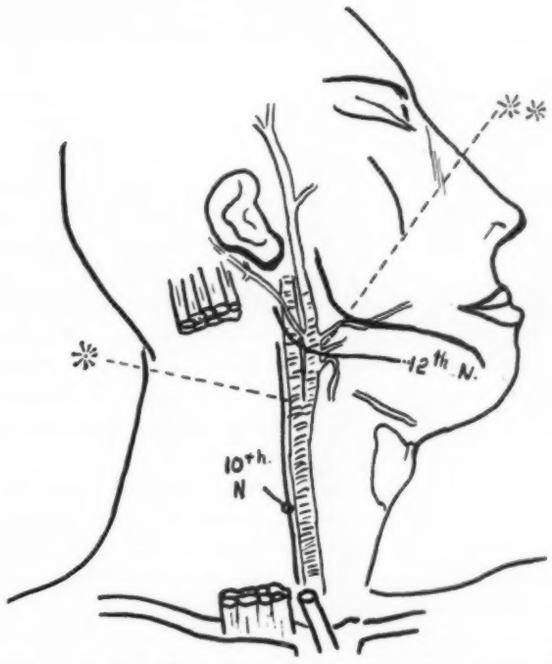

FIG. 1. Sketch illustrating the common site of normal carotid body and its tumor (*). The double asterisk (**) indicates the site of the tumor in this case.

sternocleidomastoid muscle. They may have a transmitted, but non-expansile, pulsation from the neighboring carotid vessels. Characteristically, they are movable in the horizontal but not the vertical plane.[4]

Symptoms may be absent. However, vague pains in the face and neck, hoarseness and dysphagia from projection into the pharynx do occur.

There is no apparent sex incidence. Most frequently these tumors occur in about the fourth decade.

The differential diagnoses in the order of probable frequency and importance include

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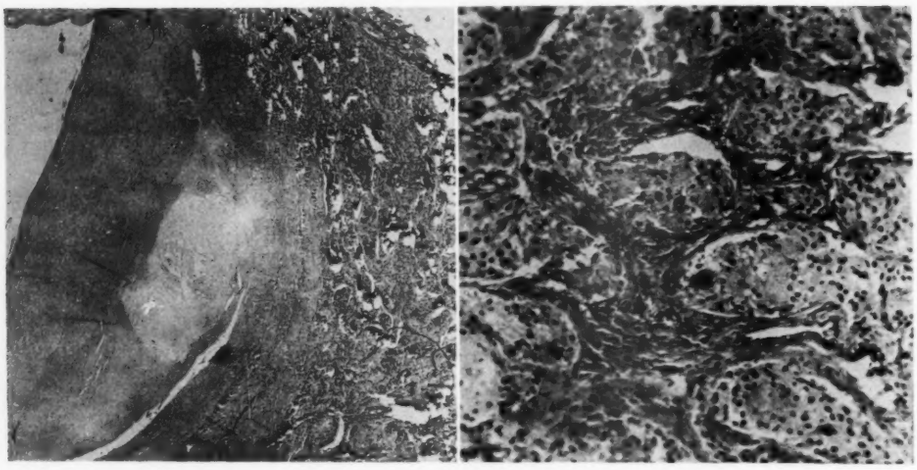

2 3

FIG. 2. Low power microscopic section indicates the atherosclerotic artery on the left with the tumor attached to the adventitia on the right. Small block illustrates approximate site of Figure 3. Hematoxylin and eosin, × 15.

FIG. 3. High power microscopic section illustrating the cell groups simulating alveoli. The nuclei are eccentric; the septae between the cell groups contain numerous sinusoids. Hematoxylin and eosin, × 150.

cervical lymphadenopathy, metastases from carcinoma elsewhere, lymphomas, neurofibromas and bronchial cyst.[2] The last-mentioned tumor is superficially located, unlike the carotid body tumor, and usually well below the carotid bifurcation.[5]

The consensus of recent articles, with the exception of that of Harrington, Clagett and Dockerty, is that the tumors are generally benign microscopically.[6] The mortality in the reported cases is approximately 30 per cent following removal of these tumors.[7] The tumor as it grows tends to encircle the carotid arterial group and the neighboring nerves. Accordingly, with such extensive involvement, all authors agree that if the tumor is benign by biopsy and frozen section, it is best to do nothing. Prohibitive morbidity and even mortality occur when the common or internal carotid arteries must be ligated to effect removal. Temporary or permanent hemiplegia results because of insufficient cerebral collateral circulations.[7] Horner's syndrome, hoarseness or damage to the vagus or hypoglossal nerves also occur during extirpation of the tumor.[8]

X-ray therapy has been used occasionally but with no conclusive result as to its value.

CASE REPORT

G. Z., a fifty-nine year old white woman, was admitted to the Grace Hospital with the chief complaint of a neck tumor of one year's duration. The tumor objectively was larger and firmer than when first observed a year ago, but there were no symptoms present. The past medical history was non-contributory. Examination revealed a solitary, firm, horizontally movable tumor about the size of a large acorn located in the right anterior cervical triangle under cover of the upper third of the sternocleidomastoid muscle. There were no other discrete tumors nor cervical lymphadenopathy.

On February 18, 1952, a 7 cm. incision parallel to the sternomastoid muscle and over the tumor was made. The muscle fibers were easily split and the discrete tumor encircling the external carotid artery only and about 2.5 cm. distal to the carotid bifurcation was revealed. (Fig. 1.) There was no attachment to other structures in or about the carotid sheath other than by filmy strands of fibrous tissue. The tumor with included vessel was removed *en toto* followed by proximal and distal ligation of the interrupted external carotid artery. Examination of the specimen revealed the external carotid segment to be almost 60 per cent occluded. A plastic closure of the wound was then performed. The postoperative course was entirely uneventful.

The gross pathologic report described the specimen removed as an oval-shaped mass measuring 3 by 2.5 by 1.5 cm. with the surface

roughened by fibrous tags. On cut section the tumor was solid, firm and a mottled gray, tan and purple in color. The tumor encircled a tubular structure (the external carotid artery) of about 3 cm. length which was almost entirely occluded.

Microscopically the larger artery had moderate atherosclerotic changes. The encircling tumor was attached to the adventitia of the artery. (Fig. 2.) It had "many blood sinusoids" and compact fibrous trabeculae coursing throughout. The cells were "arranged in solid masses and alveolar-like structures without any gland formation" with numerous interspersed sinusoids. The cells were generally polyhedral although some were "round or of a flat spindle shape." (Fig. 3.) "The tumor appeared to be encapsulated."

COMMENTS

A brief review has been made of the embryology, anatomy and function of the carotid body. Its pathologic hyperplasia and the prohibitive morbidity and mortality associated with the removal of such a tumor involving the major structures in and immediately about the carotid sheath has been stressed. In the authors' case the tumor site distant from the common carotid artery bifurcation and lack of involvement of other neighboring major structures facilitated the surgical procedure.

REFERENCES

1. Lewison, E. F. and Weinberg, T. Carotid body tumors; a case report of bilateral carotid body tumors with an unusual family incidence. *Surgery*, 27: 437–448, 1950.
2. Charache, H. Carotid body tumors. *Am. J. Surg.*, 78: 887–891, 1949.
3. LeCompte, P. M. Tumors of the carotid body. *Am. J. Path.*, 24: 305–321, 1948.
4. Bevan, A. D. and McCarthy, E. R. Tumors of the carotid body. *Surg., Gynec. & Obst.*, 49: 764–779, 1929.
5. Lahey, F. H. and Warren, K. W. A long term appraisal of carotid body tumors with remarks on their removal. *Surg., Gynec. & Obst.*, 92: 481–491, 1951.
6. Harrington, S. W., Clagett, O. T. and Dockerty, M. B. Tumors of the carotid body. *Ann. Surg.*, 114: 820–833, 1941.
7. MacComb, W. S. Carotid body tumors. *Ann. Surg.*, 127: 269–277, 1948.
8. Hendrick, J. W. Carotid body tumors. *Surgery*, 31: 385–402, 1952.

VOLVULUS OF THE GALLBLADDER*

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TORSION of the gallbladder is extremely rare. The first case was reported by Wendel[1] in 1898 and a total of ninety-one cases had been collected by Leger et al.[8] up to 1948. The purpose of this report is to draw attention to this entity which, because of its predominance in elderly people, will be seen with increasing frequency.

The disease is comparable to volvulus of the other abdominal organs as far as its mechanism and clinical signs are concerned. In all the cases described a common etiologic factor has been the abnormal mobility of the gallbladder. Meade[4] describes four types of attachment of the organ to the underside of the liver. In the first it is embedded in the liver. In the second the gallbladder is adherent to the liver and the free surface is covered by peritoneum. This is the usual disposition. In the third type the two structures are separated by fibrous tissue. In the last the fibrous tissue separation is increased in length so as to form a mesentery. If this exists, the fundus projects beyond its attachment forming a free pouch of variable length. This is the disposition which commonly preceeds torsion. A review of previously published case reports, and particularly the comprehensive series of Short and Paul,[7] reveals common predisposing clinical findings. The preponderance of cases has been in females past the age of sixty. Asthenic habitus is common with evidence of relaxation of the supporting structures and downward displacement of the abdominal viscera. Calculi do not play an important role, being found in about one-quarter of the reported cases. In the majority of cases the presenting symptom was severe upper abdominal pain of acute onset but without previous upper abdominal discomfort. The common clinical diagnoses in the order of frequency have been gallbladder empyema, intestinal obstruction, acute appendicitis and torsion of the ovary. Meade[4] initially explored a patient through a McBurney incision because of the strong suspicion of acute appendicitis. Subsequently a rectus approach was made when the nature of the problem was discovered. Certain cases proved exceptional. Dabadie[10] reported a case in a thirteen year old boy. Calissano[6] recorded one case in an eighteen year old patient and in another aged forty. Wendel's patient was twenty-three years of age. Irwin,[2] Meade[4] and Finucci[5] reported, respectively, cases in patients aged thirty-four, thirty-six and thirty-nine. Leger et al.[8] reported a case in a male aged fifty-nine while Jenckel[3] reported two cases in males aged seventy-six and eighty-eight. Husband and Schmitt[9] reported a single case associated with acute appendicitis.

CASE REPORT

An eighty-three year old white woman was admitted to the Monmouth Memorial Hospital on March 29, 1951, with a chief complaint of dull right upper quadrant abdominal pain. There was no history of previous hospital admission or of severe illness. The abdominal pain was first noted several weeks prior to admission and had persisted unchanged to the time of admission. Although food intake had been normal the patient had been constipated for several days prior to admission. On admission she was found to be a slender, active, senile white woman. The abdomen was markedly distended and a very tender grapefruit-sized mass was palpated in the right upper quadrant. The remainder of the examination revealed a loud blowing apical systolic murmur and a very marked uterine prolapse. On the day of admission the pain became increasingly severe. The initial impression was empyema of the gallbladder. The admission white count was 13,200 with 77 polymorphonuclears, 6 unsegmented polymorphonuclears, 19 lymphocytes, 3 monocytes and 1 eosinophil. On the following day no change was noted. A barium enema revealed the right side of the transverse colon to be depressed by an intrinsic mass. By the third hospital day the patient's condition remained

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unchanged. It was decided to explore the patient, with empyema of the gallbladder as a working diagnosis. Under general anesthesia the abdomen was entered through an upper rectus incision. Immediately a walled off abscess cavity containing about 250 cc. of thick, creamy pus was encountered. This was aspirated to reveal an underlying, black, grossly gangrenous viscus. The origin of this was not readily apparent but it resembled small bowel. After extension of the incision it became evident that this was the elongated fundus of the gallbladder which was suspended from the lower surface of the liver by a mesentery several centimeters in length. The base was a volvulus which was readily reduced by two turns from left to right. A cholecystectomy was performed and, following unfruitful manual exploration for a common duct stone, the abdomen was closed in layers. Postoperative examination of the removed gallbladder revealed gangrenous cholecystitis without stones. The patient made an uneventful recovery and was discharged on the ninth day after operation. The patient was last seen three months later and at that time was entirely free of complaints referable to the upper abdomen.

SUMMARY

The common predisposing clinical findings in volvulus of the gallbladder are reviewed briefly. One case is presented which is typical of former cases with the exception of complaint of upper abdominal pain of several weeks' duration immediately preceding the acute episode.

REFERENCES

1. Wendel, A. V. A case of floating gall-bladder complicated by cholelithiasis with perforation of the gall-bladder. *Ann. Surg.*, 27: 199–202, 1898. (Quoted from Meade.[4])
2. Irwin, S. T. Torsion of the gall-bladder. *Brit. J. Surg.*, 9: 310, 1921–1922.
3. Jenckel. Volvulus of the gall-bladder with gangrene. *Deutsch. Ztschr. f. Chir.*, 197: 171–174, 1926.
4. Meade, H. S. A case of torsion of the gall-bladder. *Irish J. M. Sc.*, pp. 262–264, 1929.
5. Finucci, V. Slow torsion of the gall-bladder. *Riforma med.*, 47: 801–803, 1931.
6. Calissano, G. Cholecystostosis due to partial torsion of the gall-bladder. *Minerva med.*, 2: 318–322, 1931.
7. Short, A. R. and Paul, R. G. Volvulus of the gall-bladder. *Brit. J. Surg.*, 22: 301–309, 1934.
8. Leger, L., Debeyre, J. and Mazingarbe, A. Volvulus of the gall-bladder. *J. de chir.*, 61: 21–36, 1945.
9. Husband, C. W. and Schmitt, N. L. Torsion of the gall-bladder associated with acute appendicitis. *J. Internat. Coll. Surgeons*, 8: 348–351, 1945.
10. Dabadie, J. Volvulus of the gall-bladder in a 13 year old child. *J. de méd. de Bordeaux*, 123: 298, 1946.

ENDOMETRIOSIS OCCURRING IN THE VAGINA*

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Kistner and Younge[1] have found less than forty reported cases of endometriosis in the vagina and perineum. Javert[2] has recorded seven theories as to pathogenesis of endometriosis. A combination of several—a composite theory—supported by clinical and pathologic experience is his addition. The one in favor at present is the celomic metaplasia theory of Ivanoff.

Endometriosis metastasizes in the following manner from the uterine cavity: (1) direct extension; (2) exfoliation through fimbriated ends of tubes; (3) implantation of these cells on peritoneum and adjacent organs; (4) lymphatic metastasis to regional nodes and adjacent organs; (5) hematogenous metastasis to distant organs.

Mrs. G. B. E. (No. 148545) had noticed a mass in the vagina for about four years, which had gradually become larger, but occasionally she thought it had decreased in size. There had been no discharge from the mass.

Past history revealed menarche at the age of thirteen, regular, twenty-eight-day cycle with three-day periods; moderate flow, no intermittent bleeding and no dysmenorrhea. Cesarean section was performed in 1946 because of previous vaginal plastic operation. Ligation of varicose veins, left, was done in 1949. The patient had full term deliveries in 1931 and 1936. Family history was non-contributory. Physical examination was negative except for obesity. Pelvic examination revealed scar tissue in the midline with a large mass the size of a medium-sized peach to the left side of the midline, almost closing the vagina. There was no invasion of the rectum by the mass.

Perineorrhaphy with dissection of the mass on August 6, 1951, was followed by x-ray therapy to the abdomen over the ovaries on August 15th.

Grossly the pathologic specimen consisted of a well encapsulated, ballotting cyst, which measured about 7 cm. in length and 5 cm. in diameter. Upon sectioning it discharged a large amount of thick, chocolate-colored fluid; after the fluid was removed, a cyst remained which had a pink smooth lining.

Microscopically the wall contained hemosiderin deposits, brownish pigmented cells and a fibrous stroma. Endometrial-like glands were not seen. Diagnosis was endometrial chocolate cyst.

SUMMARY

1. Pathogenesis of endometriosis is still not clear.

2. Endometriosis has been described in many locations.

3. A case of endometriosis of the vagina is presented.

REFERENCES

1. Kistner, R. W. and Younge, P. A. Endometriosis occurring in a vaginoperineal fistula. *Am. J. Obst. & Gynec.*, 63: 455, 1952.

2. Javert, C. T. Pathogenesis of endometriosis based on endometrial homeoplasia, direct extension, exfoliation and implantation, lymphatic and hematogenous metastases. *Cancer*, 2: 399, 1949.

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New Instruments

A NEW, AUTOMATIC SKIN CLIP APPLIER AND SKIN CLIP REMOVER

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SKIN clips have been used for many years to close incisions and wounds but their popularity has been limited by certain inherent disadvantages. These include the necessity for reloading the clip applier for each clip, and the occasional difficulty and discomfort in removing the clips from the wound.

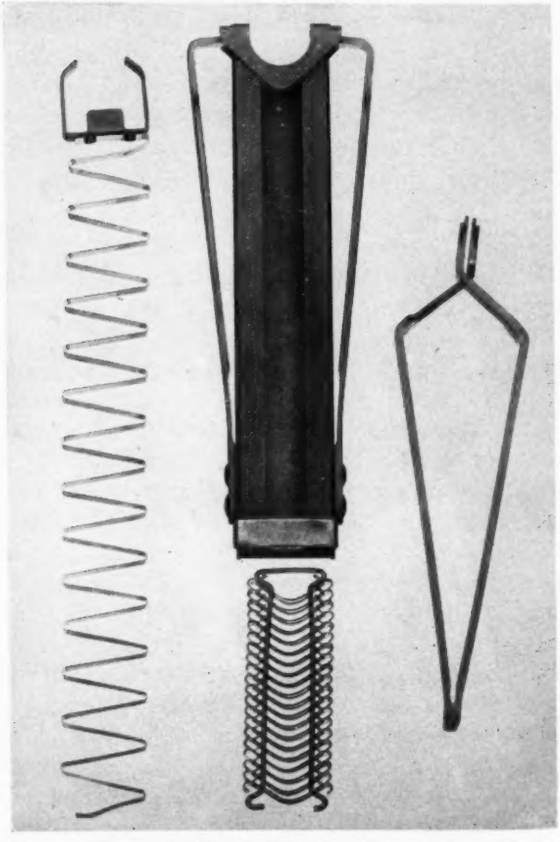

Fig. 1. The autoclip applier is shown disassembled. The autoclip remover is beside it.

A new instrument has been devised which consists of a simple, lightweight, automatic clip applier which holds a rack of twenty 18 mm. double-toothed clips, obviating the necessity of reloading the instrument except between cases. The clips can be applied with much less effort than was formerly necessary and as rapidly as the surgeon's dexterity will permit because they are automatically forced into position by a spring. Without assistance the average skin incision can be closed in less than one minute. The clips are broad and provide a neat closure, yet leave a minimum of scar. Orthopedic surgeons and others who are in the

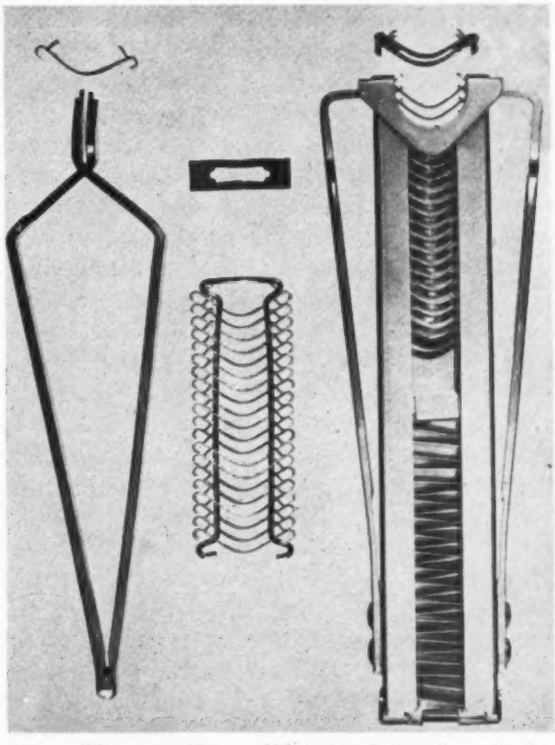

Fig. 2. The autoclip applier is loaded and ready for use. Note the autoclip remover adjacent to the clip.

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habit of sewing skin towels to the wound margins will find the apparatus particularly useful for this purpose. Also, the automatic applier should find great use among military surgeons close to the battle lines where speed and simplicity are particularly important.

Figure 1 shows the autoclip applier with the spring assembly removed to demonstrate that the instrument consists of only two pieces. Note that the rack of twenty clips is easily inserted, point end first. The spring assembly is then replaced, pusher bar end first. With the spring compressed, the spring retainer cap is snapped shut to maintain compression. The autoclip applier is now ready for use after the wire rack, on which the autoclips are mounted, is pulled out. This whole procedure of loading the device requires only a few seconds of time.

Figure 2 shows an individual skin clip from two different views. Its increased width means that fewer clips are necessary to obtain excellent wound closure. Also, the loaded instrument is shown ready for use. It has a rather broad finger grip so that it does not tend to twist within the surgeon's hand.

The autoclips can, of course, be removed by the ordinary clip removers to be found in any hospital. However, a new clip remover has been produced to facilitate the painless removal of these skin clips. Reference to the illustrations will reveal how very simple this second instrument actually is. Instead of prying a blade between the arch of the clip and the wound edge (a process that is often painful), with this method the clip remover is simply placed on top of the skin clip and the points are engaged in the ends of the clip. A gentle squeezing of the instrument will readily spread the clip open so it can be easily lifted away from the wound in one maneuver.

SUMMARY

The autoclip applier with autoclips* seems to have overcome the former technical difficulties associated with wound clip skin closure and the method is reliable and easy to use. When used with the autoclip remover* a new peak of efficiency is reached in the problem of wound closure.

* Manufactured by the Technical Oil Tool Corporation, Los Angeles, Calif. Distributed by the Clay-Adams Co., Inc., New York, N. Y.

A NEW BRONCHUS CLAMP

ITS ADAPTABILITY FOR A DOUBLE CLAMP TECHNIC

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ONE of the most important steps in pulmonary resection is the management of the bronchus. The operative technic

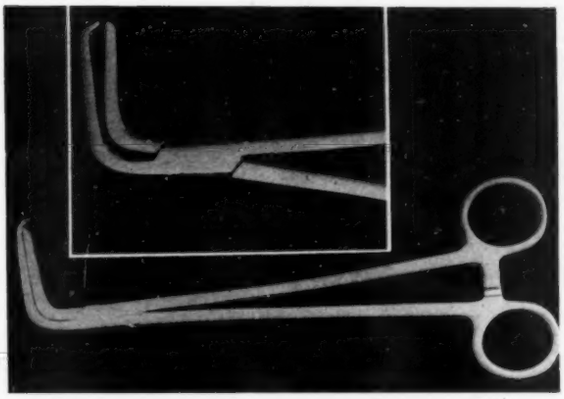

FIG. 1. The bronchus clamps.

is well established, consisting of some method of occluding and dividing the bronchus and closing the proximal stump with fine, interrupted sutures. Because of the unique structure and precarious blood supply of the bronchus careful handling and suturing is necessary to avoid tissue necrosis and bronchopleural fistula. Of prime importance, therefore, is the avoidance of crushing clamps and strangulating sutures.

The instruments currently employed to occlude the bronchus are either gallbladder or kidney pedicle clamps, or modified clamps of similar basic design. These instruments are not entirely satisfactory. Difficulty is often encountered in the placing of such clamps since they have to be held parallel to the bronchus. This is particularly true if the lung is solid and unyielding due to infection or neoplastic invasion. Furthermore, only one such clamp can be applied; double clamping is not only difficult but will crush considerable lengths of the bronchus. If occlusion of both the proximal and distal ends of the bronchus is desired, a number of maneuvers have been improvised, such as encircling ligatures of heavy silk or rubber tubing, or a row of Allis clamps as the bronchus is cut.

To overcome these technical difficulties, a new bronchus clamp* has been devised which is convenient to apply and manipulate, permitting a rapid and safe double clamp technic. As shown in Figure 1 the narrow, straight jaws of the clamp are at right angles and *in the same plane* as the ring handles. This type of angulation permits application of the clamp from the posterior aspect of the bronchus, the most accessible approach to the structure. The outer jaw has transverse serrations; the inner jaw, a deep longitudinal groove. This arrangement allows the inner jaw to slide easily into place without rolling the bronchus. The flat construction permits the employment of the clamp either singly or in pairs, depending upon the method of amputation and bronchial closure preferred. Because of the narrow, straight jaws and the type of angulation two clamps can nest side by side even on short bronchi. The same instrument can be used for both left and right lungs. The clamp is available in three sizes. The small size is suitable for segmental resections; the medium, for lobectomies and some pneumonectomies. The large size is often required for pneumonectomies, especially for a large main bronchus or if a high resection is required. This clamp can be employed with equal facility, regardless of the position of the patient on the operating table.

If a single clamp is preferred, it is applied at the desired level on the bronchus. After the jaws are closed, the handles are rotated toward the lung. This maneuver presents the straight surface of the jaws along which the bronchus can be cut. Traction sutures are then inserted in the usual manner on each edge of the flattened bronchus. The proximal stump is closed with interrupted sutures as the bronchus is divided. The clamp on the distal stump lies against the lung and is out of the way during

* The clamps are available from the J. Sklar Manufacturing Co., Long Island City, N. Y.

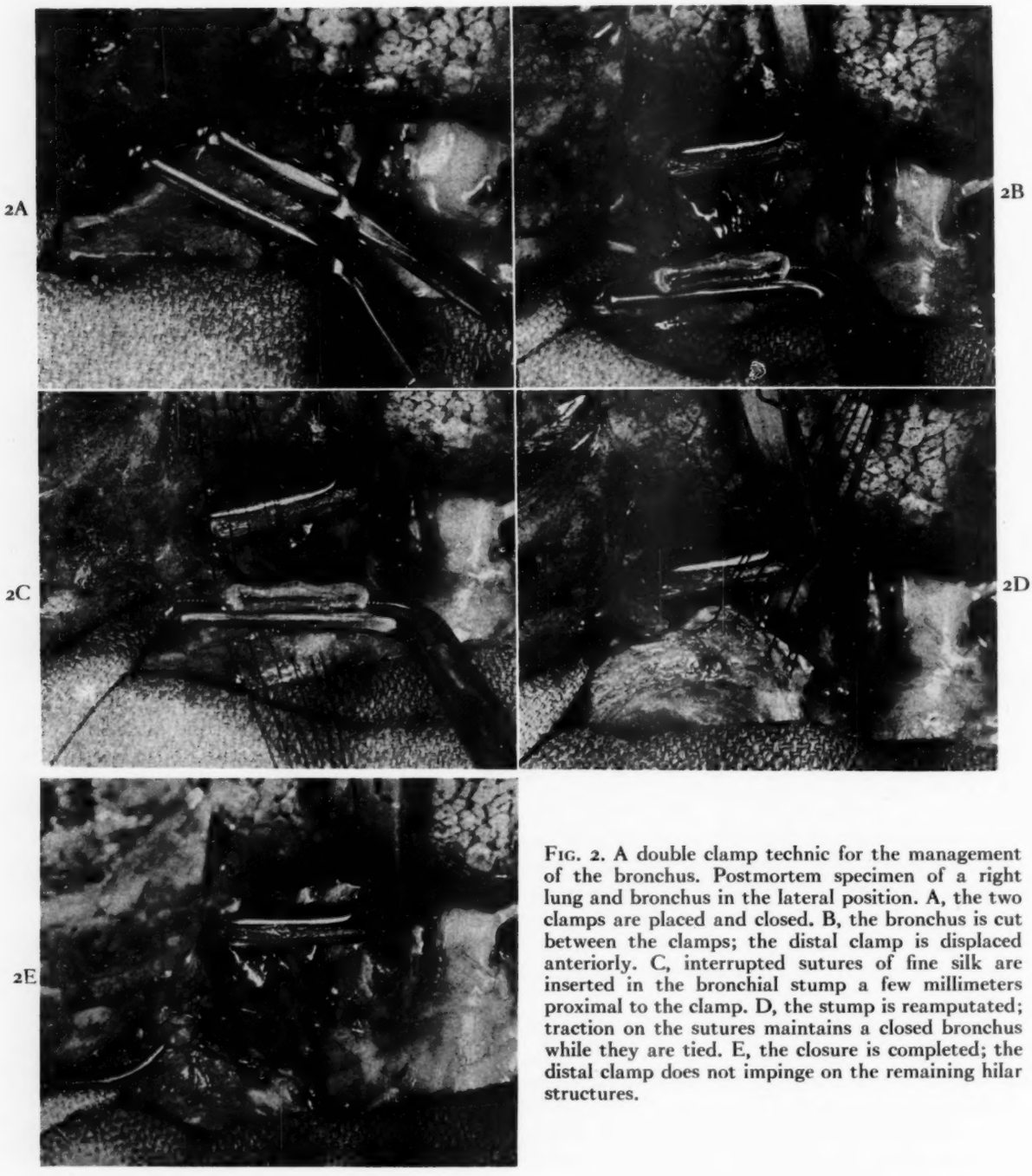

FIG. 2. A double clamp technic for the management of the bronchus. Postmortem specimen of a right lung and bronchus in the lateral position. A, the two clamps are placed and closed. B, the bronchus is cut between the clamps; the distal clamp is displaced anteriorly. C, interrupted sutures of fine silk are inserted in the bronchial stump a few millimeters proximal to the clamp. D, the stump is reamputated; traction on the sutures maintains a closed bronchus while they are tied. E, the closure is completed; the distal clamp does not impinge on the remaining hilar structures.

the remainder of the operation, a desirable feature if the hilar vessels have not yet been ligated and divided. The bronchial stump is covered with pleura.

As mentioned previously the instrument is particularly suited for a double clamp technic. As shown in Figure 2 the bronchus is divided between two clamps, leaving a short cuff of a few millimeters of bronchus on each end. The narrow jaws permit the nesting of two clamps even on short bronchi. The distal clamp is displaced anteriorly away from the operator. The clamp on the proximal bronchial stump is used for traction and can be held by the operator as he inserts interrupted silk sutures a few millimeters proximally. The sutures are then displaced to permit reamputation of the portion of bronchus held within the jaws of the clamp.

Traction on the sutures as they are tied maintains a closed bronchus. Additional interrupted sutures may be inserted if necessary.

The technic described permits rapid closure of the bronchus and eliminates the need of traction sutures. Proper alignment of the cartilaginous and membranous portions of the bronchus is maintained by the clamp until the sutures have been inserted. This alignment is often lost when a single clamp and traction sutures are employed. The closed system of anesthesia is not disturbed. Spillage of infected material from the bronchus is avoided as well as the entrance of blood into the air passages. The management of the bronchus can be completed, as the first step of the operation or reamputation and closure can be done after the lobe or lung has been removed. This technic has been found very useful for segmental resections.

The clamps have been used in over fifty pulmonary resections, both in adults and children, including pneumonectomies, lobectomies and segmental resections. There were no complications referable to the bronchial stump in this series of cases.

CONCLUSIONS

1. A new bronchus clamp is presented which eliminates certain technical disadvantages of clamps currently used in pulmonary resection. It is adaptable to the various methods of bronchial closure.

2. A double clamp technic of bronchial closure is described which has been found effective and safe.

NEWBORN infants with a congenital diaphragmatic hernia large enough to cause clinical symptoms are best operated upon via the abdominal route. However, in adults whether the hernia is congenital or acquired after trauma a more satisfactory dissection and repair can usually be done via the thoracic route or through a thoracicoabdominal approach. (*Richard A. Leonardo, M.D.*)

A REVERSE ANAL CRYPT PROBE*

WILLIAM P. KLEITSCH, M.D.
Omaha, Nebraska

IN treating anal cryptitis it is often desirable to incise the anal crypts to permit more adequate drainage. Anal crypt hooks are not entirely satisfactory because of their sharp tips which make the development of excessively deep incisions too easy. A reverse angle anal crypt probe has been devised which permits blunt probing of the anal crypts without danger of producing a false passage. The instrument is in reality merely a modified grooved director. It is elongated to achieve the proper reach, and the tip is bent backward at a suitable angle to permit insertion into the anal crypt. The groove in the director tip then serves to guide the scalpel when incising the crypt.

The instrument shown in Figures 1 and 2 was manufactured by cutting an ordinary grooved director in two and soldering the tip, at a suitable angle, to one end of a Steinmann pin. The end of the grooved director was then soldered to the other end of the pin.

FIGS. 1 and 2. Side and top views of the reverse anal crypt probe described in the text.

This crude but effective piece of apparatus has been found valuable in probing and incising rectal crypts. Although as far as could be discovered this instrument is not manufactured in this country, it can be readily improvised by anyone familiar with soldering or welding technic.

* From the Surgical Services of the Creighton University School of Medicine and the Veterans Hospital, Omaha, Neb. Sponsored by the Veterans Administration and published with the approval of the Chief Medical Director. The statements and conclusions published by the author are a result of his own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

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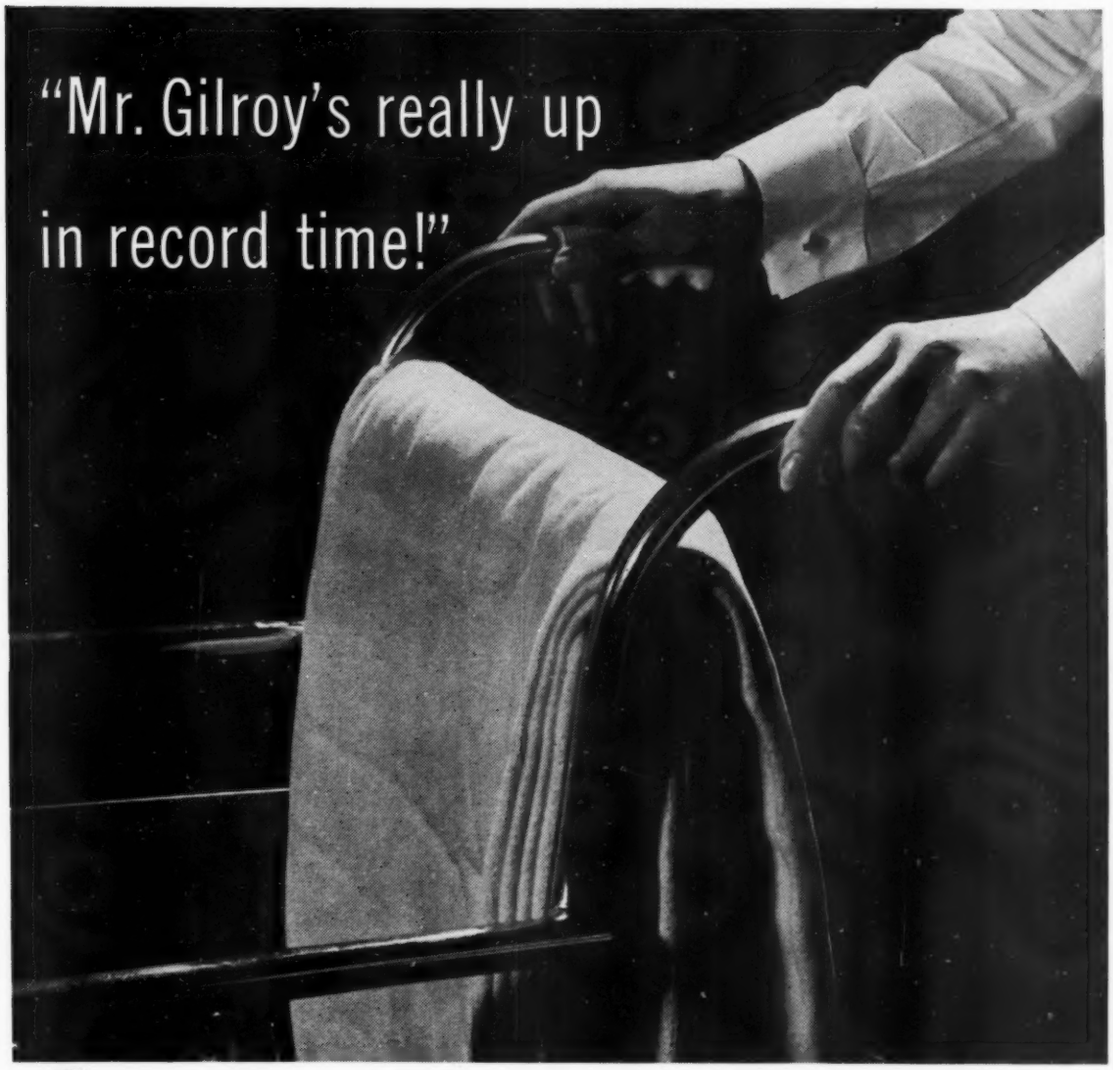

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1. Fox, C. L. Jr., et al.: An Electrolyte Solution Approximating Plasma Concentrations with Increased Potassium for Routine Fluid and Electrolyte Replacement, J. A. M. A., March 8, 1952.

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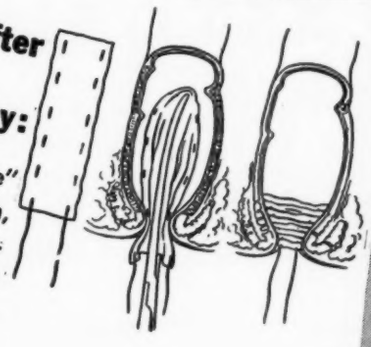

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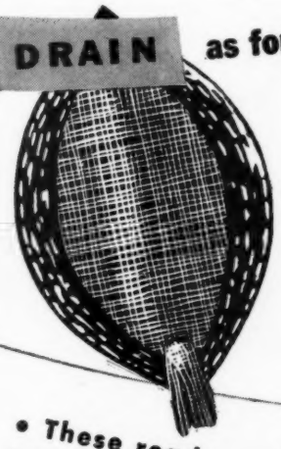

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1. Behrman, H. T., Combes, F. C., Bobroff, A., Leviticus, R.: Ind. Med. & Surg. 18:512, 1949.
2. Turell, R.: New York St. J. M. 50:2282, 1950.
3. Heimer, C. B., Grayzel, H. G., and Kramer, B.: Archives Pediat. 68:382, 1951.

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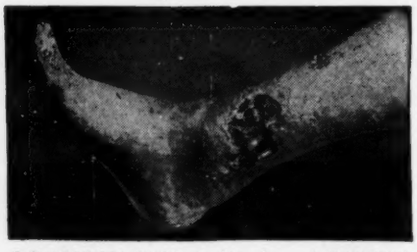

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bibliography:

Ansbro, F. P., and others: **Anesthesiology** *13*:306, 1952.

Ansbro, F. P., and others: **Journal Lancet**, in press.

Bartlett, R. W., and Eastwood, D. W.: **Surgery** *32*:956, 1952.

Bonica, J. J.: **J.A.M.A.** *150*:1581 (Dec. 20) 1952.

Borre, L. A.: **Arch. chir. néerl.**, in press.

Brown, J. M.: **M. Times, New York** *80*:583, 1952.

Cappe, B. E., and Pallin, I. M.: **Am. Pract. & Digest Treat.** *3*:739, 1952.

Crisp, W. E., and McDonald, R.: **Obstetrics and Gynecology**, in press.

Deaton, W. R., Jr., and Bradshaw, H. H.: **Am. Surgeon** *18*:616, 1952.

Bowlen, L. W.: **Bull. Dade County M. A.** *23*:30, 1952.

Gross, J. M., and Shaftel, H. E.: **New York State J. Med.** *52*:1413 (June 1) 1952.

Henderson, A. R.: **J. M. Soc. New Jersey** *49*:287, 1952.

Iason, A. H., and Shaftel, H. E.: **Am. J. Surg.** *83*:549, 1952.

Iason, A. H., and Shaftel, H. E.: **J. Internat. Coll. Surgeons**, in press.

Nylander, P. E. A.: **Ann. chir. et gynaec. Fenniae** *41*:1, 1952.

Penn, S. E.: **A.M.A. Arch. Otolaryng.** *56*:59, 1952.

Perrin, S. R.: **A.M.A. Arch. Dermat. & Syph.**, in press.

Puderbach, W. J., and Shaftel, H. E.: **Journal Lancet** *72*:203, 1952.

Raicus, E.: **M. Times, New York** *80*:156, 1952.

Roualle, H. L. M.: **Brit. M. J.** 2:1293 (Dec. 13) 1952.

Tucker, C. C.: **J. Kansas M. Soc.** *53*:230, 1952.

Weinberg, T.: **J. Sinai Hosp., Baltimore** *1*:21, 1952.

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1. Bowers, W. F.: Am. J. Surg. *73*:37, 1947.
2. Pollock, L. J., and others: J. A. M. A. *146*:1551 (Aug. 25) 1951.
3. Niemiro, B. J.: Journal Lancet *71*:364, 1951.
4. Lowry, K. F.: Postgrad. Med. *11*:523, 1952.
5. Combes, F. C.; Zuckerman, R., and Kern, A. B.: New York State J. Med. *52*:1025, 1952.

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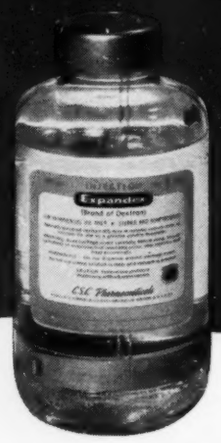

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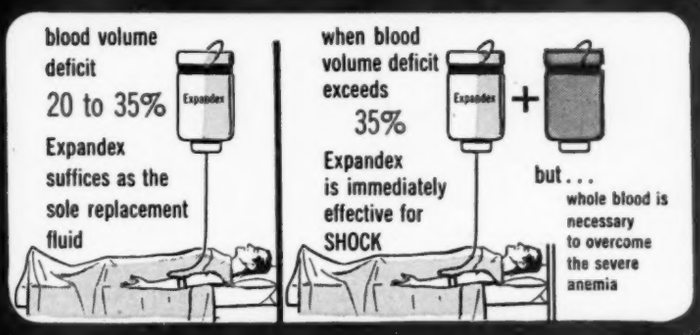
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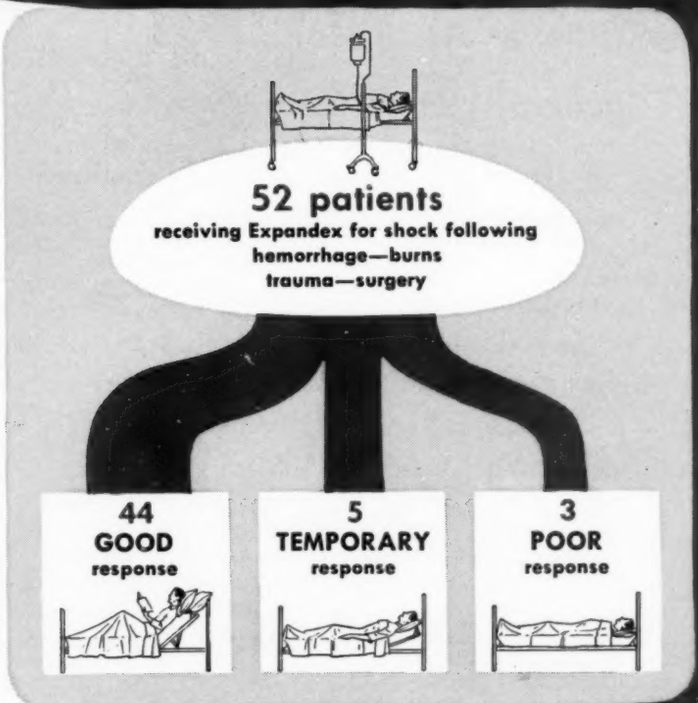

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References

1. Witham, A. C.; Fleming, J. W., and Bloom, W. L.: The Effect of the Intravenous Administration of Dextran on Cardiac Output and Other Circulatory Dynamics, J. Clin. Investigation 30:897 (Sept.) 1951.

2. Fleming, J. W.; Cargill, W. H., and Bloom, W. L.: Effects of Intravenous Administration of Dextran on Renal Function, Proc. Soc. Exper. Biol. & Med. 79:604 (Apr.) 1952.

3. Bloom, W. L.: Dextran: A Polysaccharide for the Expansion of Plasma Volume, South. M. J. 45:457 (May) 1952.

4. Bloom, W. L.: Present Status of Plasma Volume Expanders in the Treatment of Shock; Clinical Laboratory Studies, A.M.A. Arch. Surg. 63:739 (Dec.) 1951.

5. Hellman, L.: National Research Council Report, October, 1951.

6. Terry, R., and Yuile, C. L.: Fate of Intravenous C^{14}-Labeled Dextran in Dogs, read at the 36th Annual Meeting of the American Society for Experimental Pathology, New York, April 14-18, 1952; abstracted, Federation Proc. 11:430, 1952.

7. Lathrop, K. A., and Allen, J. G.: Progress Report: Metabolism of Dextran, Quarterly Report of the Biological and Medical Research Division of the Argonne National Laboratory, in press.

8. Spence, J. H.; Higgins, A. R., and Kimmel, J. R.: The Clinical Effects of Dextran as a Plasma Volume Extender, U. S. Armed Forces M. J. 3:515 (Apr.) 1952.

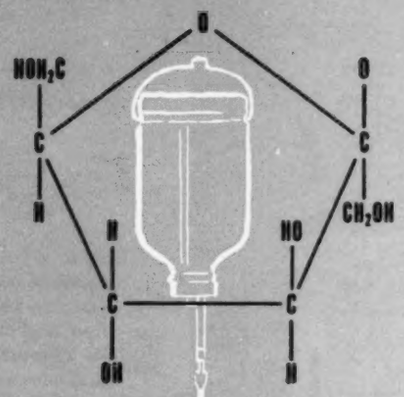
9. Wilson, J. S.; Estes, E. H., Jr.; Doyle, J. T.; Bloom, W. L., and Warren, J. V.: The Use of Dextran in the Treatment of Blood Loss and Shock, Am. J. M. Sc. 223:364 (Apr.) 1952.

10. DeBakey, M. E.; Haynes, B. W., and Amspacher, W. H.: Treatment of Wound Shock, in Symposium on Shock, Washington, D. C., Army Medical Service Graduate School, May, 1951.

Additional Bibliography

Ravdin, I. S.: Plasma Expanders, J. A. M. A. 150:10 (Sept. 6) 1952.

Gropper, A. L.; Raisz, L. G., and Amspacher, W. H.: Plasma Expanders: A Collective Review, Internat. Abstr. Surg., Surg., Gynec. & Obst. 95:521 (Dec.) 1952.



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Since Levugen is removed from the blood very rapidly, it does not produce high hyperglycemic levels or spill over into the urine in significant amounts even when it is infused in fairly high concentration.[1,2,3] Levugen can therefore be given much more rapidly than dextrose, with less loss of potential calories through glycosuria. A liter of Levugen 10% in Water can be given in the same time as a liter of 5% dextrose.

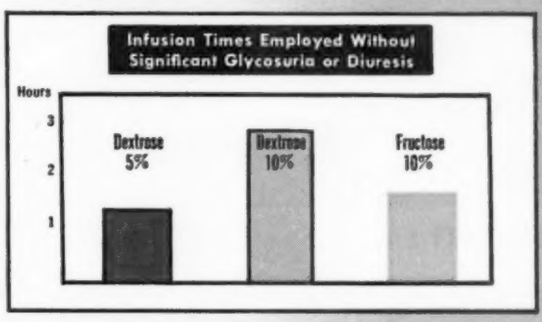
Experimental evidence indicates, moreover, that Levugen is more rapidly and completely utilized for hepatic glycogen formation than is dextrose.[1,4]

Clinical Advantages of Levugen

- More rapid and adequate provision of calories
- Less loss of calories through glycosuria
- More rapid formation of liver glycogen
- Less disturbance of fluid balance
- Shorter infusion time, with less discomfort for the patient
- Less time and trouble for hospital personnel

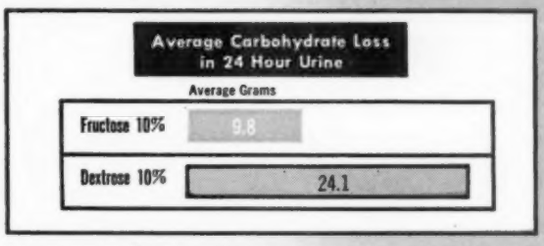
Levugen 10% in Water is available in 1 liter (1000 cc.) flasks, containing 100 Gm. of Levugen (Fructose, Mead), approximately 400 calories.

LEVUGEN GIVEN TWICE AS RAPIDLY AS DEXTROSE



Based on infusion rates per liter reported by Lockhart and Elman[3] (for dextrose) and Weichselbaum et al.[2] (for fructose).

MUCH LESS URINARY LOSS OF CALORIES WITH LEVUGEN



Based on data from Elman.[5] Infusion of 2 liters of each solution into the same subjects on alternate days.

References: (1) Nutrition Rev. 9: 173-175, 1951; (2) Weichselbaum, T. E., et al.: Proc. Soc. Exper. Biol. & Med. 75: 816-818, 1950; (3) Lockhart, C. E., and Elman, R.: Surg., Gynec. & Obst. 88: 97-102, 1949; (4) Cori, C. F.: J. Biol. Chem. 70: 577-588, 1926; (5) Elman, R.: Personal Communication.

Levugen

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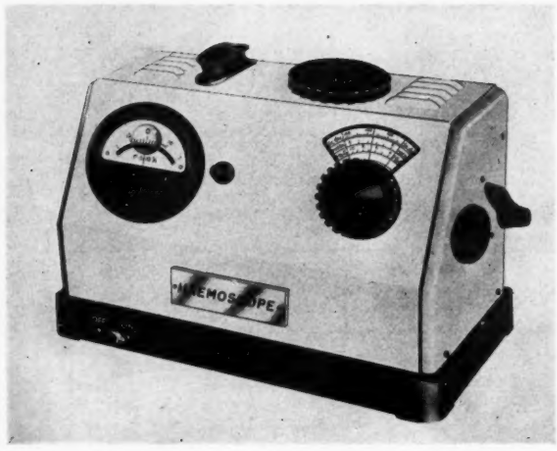
Outside the Ivory Tower



AN instrument designed to render an accurate blood count automatically has been announced by the Haemoscope Corporation, 101 Park Avenue, New York City. Designed to give a red blood cell count in a few seconds as contrasted with the time taken to perform a chamber count, this photronically operated instrument is not only more accurate and time-saving but also achieves great reproductibility. It is a distinct advance in the field of automatic blood counting because, unlike its predecessors, the Haemoscope actually compensates for variation in cell diameters over a fairly wide range.

Basing their invention on the fundamental principle of the measurement of light diffraction, Drs. Hans H. Loeschke and Ruetger Wever of the University of Gottingen, Germany, made an ingenious application of certain well known laws of diffraction, as expounded by Tyndall in 1868, and by Rayleigh somewhat later. The problem of developing from these findings a simple, practical, working instrument was attacked and solved in its later stages by Dr. J. A. Tonnies, of Freiburg, Germany, the eminent physicist and doctor of engineering, who is especially known in this country for his research in neurophysiology and his pioneer work in electroencephalography. Dr. Tonnies is the inventor of the technic of differential amplification now in general use the world over for all modern electrocardiographs and electroencephalographs.

THE Foundation of the American Society of Plastic and Reconstructive Surgery announces the regulations of the fourth Annual Scholarship Contest: (1) The contest is restricted to residents in training, and plastic surgeons who have been in practice no longer than five years. (2) Two main prizes are offered, each consisting of a six months plastic surgical scholarship with active assistantship and full maintenance in a number of selected leading services. (3) The subject matter of the essay must be the result of some original, either clinical or laboratory research in plastic and reconstructive surgery and about 5,000 words in length. (4) Traveling expenses between the services in the United States will be allotted. (5) A Silver Plaque or Certificate of Honorable Mention is also offered for a winning essay in senior classification to contestants active in practice of plastic and reconstructive surgery for more than five years. (6) Manuscripts will not be accepted by the Award Committee after August 1, 1953.

The winning essays will appear on the program of the Annual Meeting of the American Society of Plastic and Reconstructive Surgery, to be held at Coronado, California, November 2–6, 1953. For further information write to the Award Committee, c/o Jacques W. Maliniac, M.D., Chairman, 30 Central Park South, New York 19, N. Y.

AS the result of extensive research in carbohydrate chemistry, Mead Johnson & Company has successfully developed a method to manufacture pure fructose on a large scale. Now for the first time available for general clinical use, it is being introduced under the trade name, levugen.® Levugen (fructose, Mead) can be infused twice as rapidly as dextrose with better retention and less disturbance of fluid balance. Levugen 10% in water is available in 1,000 cc. flasks providing 400 calories.

UNDER an arrangement The Williams & Wilkins Company is publishing the *American Surgeon* for The Southeastern Surgical Congress and The Southwestern Surgical Congress. We have seen the January issue (the first one published). It is top hat! Our congratulations and best wishes!

(continued on page 48)

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The Surgical Engineering Company, Inc.

Outside the Ivory Tower

(*continued from page 46*)

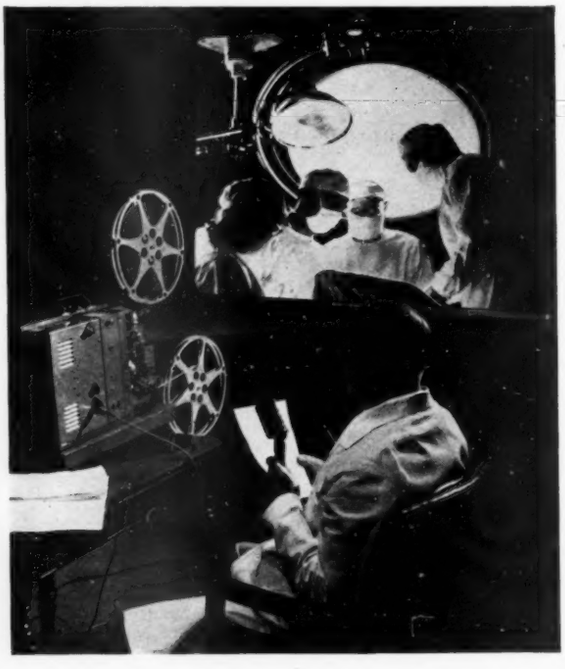
GAMMA globulin is the latest of preventative substances to deter the agonizing crippling effects of polio. This blood by-product is being extracted from blood collected by the Red Cross. Gamma globulin will be used to immunize children during the coming polio season. Last November the Office of Defense Mobilization asked the Red Cross to expand its blood collections to produce as much gamma globulin for all purposes as blood processing laboratories can turn out. The Office of Defense Mobilization will coordinate the distribution of this newest of life savers.

In addition to this new undertaking the Red Cross must also continue to collect blood to meet the needs of the Korean-wounded, the nation's plasma reserve and a portion of the blood for civilian hospitals. The total program will require approximately 5,000,000 pints of blood and will cost the Red Cross over $20,000,000 next year. This project is only one of many Red Cross activities and the money only a portion of the much needed $93,000,000 to carry on the humanitarian efforts of the American Red Cross.

FIFTEEN medical scientists, including two Nobel Prize winners, went to India early in February under joint sponsorship of the World Health Organization and the Unitarian Service Committee, to exchange the latest medical knowledge with Indian physicians, medical educators and public health specialists in Madas and Bombay. This visiting team of doctors is being sent at the request of the Ministry of Health of India. It is the fifth such overseas health project in which the Unitarian Service Committee has cooperated with the WHO.

A COMPARATIVELY new drug called hyaluronidase® has come to the aid of people who suffer painful ankle sprains. Use of the drug, an enzyme made from the tissue extract of the bull, in the treatment of painful sprains was explained to the American Academy of Orthopedic Surgeons by Dr. W. R. MacAusland, Jr., of the United States Air Force Hospital, Maxwell Air Force Base, Alabama. He said that when the drug is injected into the injured ankle, swelling is reduced and pain relieved within two hours.

THE history of Houston's Texas Medical Center reads like a proverbial "tall Texas tale," and it is tall but it is also true. For in the short space of seven years the Center has become one of the outstanding institutions of its kind anywhere and it is still growing. The continuous program of development and expansion shows no sign of abating, with new buildings, new facilities for research and new teaching programs being constantly added to this mammoth health project. When facilities already under construction and on the drafting boards are completed, the Center will be able to count 3,350 beds, which will represent an outlay of more than fifty-six million dollars on a 163 acre tract.



RECORDING commentary to accompany a film on surgical procedures can be easily accomplished in the hospital or the surgeon's office with a new 16 mm. recorder-projector, the RCA "400" Magnetic Sound Projector, which provides the first means of recording sound magnetically on the edge of 16 mm. picture film. No laboratory or studio facilities are required; the recording can be played back immediately, and any necessary revision can be made quickly by means of an electronic "erase" feature which blanks out the portion to be re-recorded.

(*continued on page 50*)

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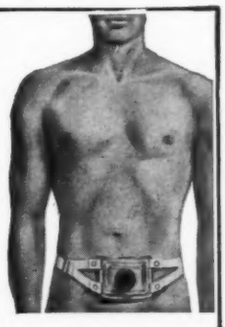

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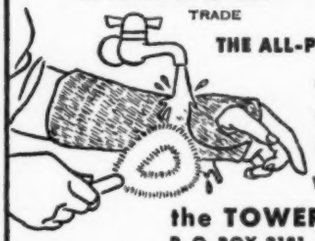

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Outside the Ivory Tower

(*continued from page 48*)

AN advanced course in autoradiography and three basic courses in radioisotope technics are offerings of interest to medical and biological personnel planned this spring and summer by the Special Training Division of the Oak Ridge Institute of Nuclear Studies. The autoradiography course will be held from June 15–25, and basic courses of four weeks' duration will begin on June 8th, July 6th and August 10th. This course will be the second to be given at Oak Ridge, an earlier one having been given in the summer of 1951. It is intended for research level personnel using or planning to use this technic in their research. Lectures, consultations, laboratory demonstrations and discussions will comprise the course. Leaders in the field will be on hand as lecturers and demonstration supervisors. Subjects to be covered include both the application of the autoradiographic method and the theoretical bases of the method. Application forms and additional information may be obtained from the Special Training Division, Oak Ridge Institute of Nuclear Studies, P. O. Box 117, Oak Ridge, Tenn.

THIS month the best we can do is to list the books we have received for review. We list only those we believe are above the average and that we can recommend to those interested in a particular subject.

The Toxemias of Pregnancy, by William J. Dieckmann, M.D. 2nd ed., with 85 text illustrations and one color plate. 710 pages. The C. V. Mosby Company. $14.50.

The Metabolic Response to Surgery, by Francis D. Moore, M.D. and Margaret R. Ball, A.B. American Lecture Series. Metabolic Drawings by Mildred B. Codding, A.B., M.A., 167 pages with 56 illustrations. Charles C Thomas. $7.50.

Functional Endocrinology, from Birth through Adolescence, by Nathan B. Talbot, M.D., Edna H. Sobel, M.D., Janet W. McArthur, M.D. and John D. Crawford, M.D. A Commonwealth Fund Book. 638 pages, illustrated. Harvard University Press. $10.

Textbook of Surgery, edited by H. F. Moseley, M.A., D.M., M.CH., F.A.C.S., F.R.C.S. (Eng.), F.R.C.S. (C), with a foreword by G. Gavin Miller, M.D., C.M., M. SC., F.R.C.S., F.A.C.S., 896 pages, with 400 text illustrations and 46 color plates. The C. V. Mosby Co. $15.

Synopsis of Pathology, by W. A. D. Anderson, M.A., M.D., F.A.C.P., 3rd ed., 788 pages with 344 text illustrations and 13 color plates. The C. V. Mosby Co. $8.

Gynecologic and Obstetric Pathology with Clinical and Endocrine Relations, by Emil Novak, A.B., M.D., D.SC. (Hon., Trinity College, Dublin, Tulane), F.A.C.S., F.R.C.O.G. (Hon.) 3rd ed., 595 pages with 630 illustrations, 19 in color. W. B. Saunders Company. $10.

Operating Room Technic. St. Mary's Hospital, Rochester, Minnesota, 4th ed., illustrated, 345 pages. W. B. Saunders Company.

Prostectomy, A Method and Its Management, by Charles Wells, Prof. of Surgery, The University of Liverpool, 103 pages with 72 illustrations. The Williams & Wilkins Company. $5.

Surgery and the Endocrine System: Physiologic Response to Surgical Trauma, Operative Management of Endocrine Dysfunction, by James D. Hardy, M.D., F.A.C.S., 153 pages, illustrated. W. B. Saunders Company. $5.

Textbook of Surgical Treatment: Including Operative Surgery. Edited by C. F. W. Illingworth, Regius Prof. Surgery, Univ. of Glasgow. Compiled with twenty-two contributors; 4th ed., 744 pages; illustrated. The Williams & Wilkins Company. $9.

Textbook of General Surgery, by Warren H. Cole, M.D., F.A.C.S. and Robert Elman, M.D., F.A.C.S. Foreword by Evarts A. Graham, M.D., F.A.C.S., 6th ed., 1,154 pages; illustrated. Appleton-Century-Crofts, Inc.

The Treatment of Injuries to the Nervous System, by Donald Munro, M.D., F.A.C.S., 284 pages with 47 figures. W. B. Saunders Company. $7.50.

Surgery of the Chest: A Handbook of Operative Surgery, by Julian Johnson, M.D., D.SC. and Charles K. Kirby, M.D., illustrated by Edna Hill, 387 pages. The Yearbook Publishers. $9.

The Mechanisms of Disease. A Study of the Autonomic Nervous System, the Endocrine System and the Electrolytes in Their Relationship to Clinical Medicine, by Joseph Stambul, M.D. Foreword by George Morris Piersol, B.S., M.D., 746 pages; extensive bibliography and index. Froben Press, Inc. $15.

(*continued on page 52*)

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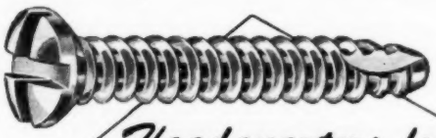

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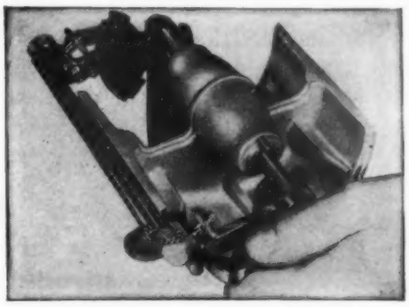

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Outside the Ivory Tower

(continued from page 50)

Functional Neuroanatomy, by Wendell J. S. Krieg, B.S., PH.D. Illustrations and decorations by the author; 2nd ed. revised and augmented; 659 pages. The Blakiston Company. $9.

Essentials of Medical Research, by Wallace Marshall, M.D., 176 pages. Vantage Press, Inc. $3.

Handbook of Orthopaedic Surgery, by Alfred Rives Shands, Jr., B.A., M.D., in Collaboration with Richard Beverly Raney, B.A., M.D.; illustrated by Jack Bonacker Wilson and others; 4th ed., 644 pages. The C. V. Mosby Co. $8.

Synovial Fluid Changes in Joint Disease, by Marian W. Ropes, M.D. and Walter Bauer, M.D., 150 pages, illustrated. A Commonwealth Fund Book. Harvard University Press. $4.

Pathology in Surgery (The Application of General and Special Pathology in the Examination of Surgical Tissues), by Edwin F. Hirsch, PH.D., M.D., photographs by Inez M. Porter; 474 pages, 388 photographs, 2 color plates (4 parts in each plate). The Williams & Wilkins Company. $10.

DOES your nose really know what it's smelling? "Odor blindness" may be more common than color blindness, Dr. Raoul Pantaleoni, a chemist who is director of the industrial division of van Ameringen-Haebler, Inc., New York, told the Monmouth County Section of the American Chemical Society. Dr. Pantaleoni estimated that there may be more partial anosmics—individuals with imperfect odor perception—than color blind people. He added that there is some evidence that odor blindness like color blindness is inherited. Proper breathing is necessary for a good sense of smell, Dr. Pantaleoni said in his talk entitled "Odor and Fragrance."

"For proper sniffing, it is necessary to inhale with sufficient force to perceive the odor. Many persons in ordinary breathing do not exert sufficient pressure to propel materials up into the olfactory cleft," the speaker explained.

"There are many reports in the literature of acute odor sensitivity among savages, animals and fish. This is due to the biological dependence of the uncivilized on olfaction for self-preservation as well as for preservation of the species. Most of the typical baits used by hunters are based on odor attraction and appeal to the nutritional or sexual interests of animals. Man is largely independent of his nose in procuring the necessities of life and therefore his olfactory acuity has degenerated. He does use olfaction to satisfy his sense of esthetics."

ARE ANTIVIVISECTIONISTS insane? Is their "humanitarianism" a mask for their own bitter hatreds and vicious urges? In order to let the public judge for itself, the National Society for Medical Research has published samples of antivivisectionist letters in a photo-offset leaflet entitled: "Fan Mail for Scientists." The publication affords a startling view of the antivivisectionist mind.

One member of the cult writes: "You fancy yourselves men; I am a woman. But my great pleasure would be the experiment to end all experiments, and this would be made on you. I know a number of places on your bodies, which might be most sensitive to pain. I wonder if you would react to my satisfaction? Would you feel pain as horribly as it is possible to know pain? Would you remain conscious the correct length of time? Would we learn anything new in the art of torture? . . . " Another: "Dogs are better than human beings. What are human beings—trouble makers and two faced."

Publication of this collection of AV letters was explained by Dr. A. J. Carlson, President of the National Society for Medical Research as follows: "The recent murder of an 18-year-old secretary in the offices of the American Physical Society brought home to many of us that the so-called "harmless crackpots" are not always so harmless. Several years ago an antivivisectionist shot at, but did not hit, Dr. Harry Goldblatt, world renowned heart specialist of the Cedars of Lebanon Hospital in Los Angeles. Recently antivivisectionists have threatened the lives of the vice president and two members of the faculty of the University of Illinois. We believe the public should know the antivivisectionists for what they are. Therefore, we have reproduced in the leaflet, "Fan Mail for Scientists," a few typical letters from our files. We could not reproduce the most violent letters because the language is so vile that the resultant publication could not be sent through the mail."

(continued on page 54)

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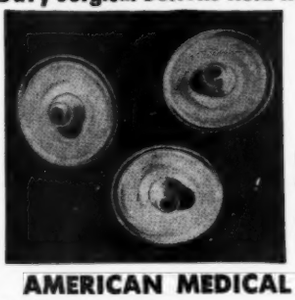

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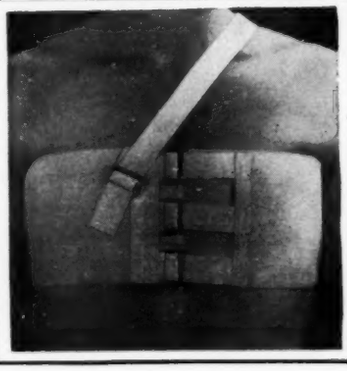

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Outside the Ivory Tower

(*continued from page 52*)

WHEN tuberculous lesions are localized to individual segments or groups of segments of the lung, the "quickest, safest, and surest method of controlling such lesions is simply to open the chest, detach the diseased segments from the healthy segments, excise them, and leave the patient with normal pulmonary segments." This was the opinion expressed by Dr. Richard H. Overholt, professor of surgery, Tufts College Medical School, Boston, at the fiftieth anniversary meeting of the New York Tuberculosis and Health Association in New York City.

"This direct approach to the problem," said Dr. Overholt, "immediately divorces the infected lung from the healthy segments and protects the patient from the continual bathing of the healthy segments by infected material from the diseased segments.

"It has the added advantage of preserving the function of all healthy segments. From this point of view, segmental resection has a tremendous advantage over any collapse procedure, for in no instance can the collapse of the diseased areas be effective without altering function of adjacent pulmonary tissue."

OVERWEIGHT not only shortens life but it may also handicap the individual socially, economically and psychologically, according to statisticians of the Metropolitan Life Insurance Company. The adverse effects of overweight on health begin to be evident in the earlier years of life, but they show up more and more as the individual moves along in life. The fat girl is often the wallflower and is usually less popular as a "date." As she gets older her chances for marriage are less than for her thinner rivals. Fat persons of both sexes are handicapped in finding jobs, either through self-consciousness or because employers prefer applicants of normal weight. Even the overweight adult may not be the jolly individual he is usually pictured. His weight is sometimes a reflection of his feeling of inadequacy and an inclination to obtain pleasure from eating rather than normal social intercourse. Severe as the personality handicaps may be, the major penalty of overweight is its effect on health. The list of diseases brought on or made worse by overweight is a long one.

THE Honorable C. C. McLaurin, Chief Justice, Trial Division of the Supreme Court, Province of Alberta, will be a guest speaker at the Sectional Meeting of the American College of Surgeons, convening at the Palliser Hotel in Calgary, Alberta, April 23rd and 24th. This is the first Sectional Meeting in Calgary since 1927. More than 300 surgeons are expected to attend this program covering problems of current surgical interest. Donald G. MacQueen, M.D., F.A.C.S., Calgary, Chief of Surgical Staff, Colonel Belcher Hospital, is Chairman of the Local Committee on Arrangements.

THE story of chlorophyll in medicine and its clinically substantiated properties as an aid to normal healing are described comprehensively in a new booklet prepared by the Rystan Company, Mt. Vernon, N. Y., which is now available without charge to physicians, pharmacists, schools and libraries. Nearly 100 references to reports in medical journals are brought together in what the Company believes to be the most complete and definitive report yet available on this increasingly significant subject. Included in the monograph are a history of man's interest in chlorophyll; the pharmacodynamics of this unique substance; its many properties, particularly in encouraging the normal healing of resistant wounds and ulcers; and a review of the clinical applications of water-soluble chlorophyll preparations.

THE practice of medicine is changing, with an increase in emphasis on personal, family, and social problems as they influence health and illness, says Dr. Leslie Osborn in a book published recently. Dr. Osborn is professor of psychiatry at the University of Wisconsin and director of the Wisconsin Psychiatric Institute and the division of mental hygiene of the Wisconsin State Department of Public Welfare.

The book entitled "Psychiatry and Medicine" is an introduction to the principles of personalized medicine. It is important, Dr. Osborn believes, that the doctor know each of his patients, for personal attitudes may have a great deal to do with illness. Illness of any form is a personal experience, Dr. Osborn says, and the personal relation of doctor and patient is always important.

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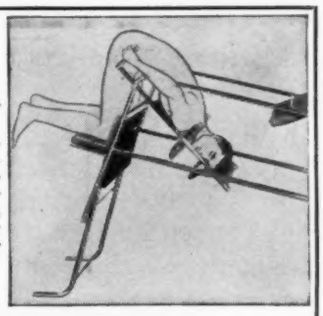

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AJS 4-53

Meat...

and the Low Sodium Diet

The beneficial effect of sodium restriction in the management of hypertension and many types of cardiac disease is firmly established. A low sodium diet aids in preventing edema and frequently leads to a significant reduction in arterial tension.

To emphasize the importance of sodium restriction and to enable the physician to present his patient with an informative discussion of the subject, The American Heart Association has just published a valuable pamphlet entitled "Food For Your Heart."* Covered also in this booklet is the importance of weight reduction in the management of the cardiac patient.

Dietary recommendations for three levels of sodium restriction are given. In all of them, meat is an important constituent of the diet. In the diet providing moderate sodium restriction (0.5 to 1.5 Gm. of sodium), 4 to 6 ounces of unsalted meat, fish or fowl are allowed. In severe restriction (0.5 Gm. sodium), 3 to 4 ounces of meat are permitted daily. The weight reduction-moderate sodium restriction diet calls for 5 to 6 ounces of meat daily.

This booklet again emphasizes the valuable application of meat in the dietary management of cardiac disease, hypertension, and obesity. Since, as the manual emphasizes, infectious diseases and such scourges as typhoid fever have now been controlled with antibiotics, chemotherapeutic agents and modern sanitation, "many physicians and scientists consider nutrition the most important environmental factor in health."

Meat, with its wealth of high quality protein, B complex vitamins and important minerals, plays an important role in the aim toward better national health. That the generous consumption of meat by the American people is a significant factor in attaining this goal is reflected in the statement that "most physicians feel that the high American consumption of protein is a good thing."

---

*Food for Your Heart, a Manual for Patient and Physician, Department of Nutrition, Harvard School of Public Health, Harvard University, The American Heart Association, Inc., New York, 1952. Copies available through local Heart Association.

The Seal of Acceptance denotes that the nutritional statements made in this advertisement are acceptable to the Council on Foods and Nutrition of the American Medical Association.

American Meat Institute
Main Office, Chicago...Members Throughout the United States

The American Journal of Surgery

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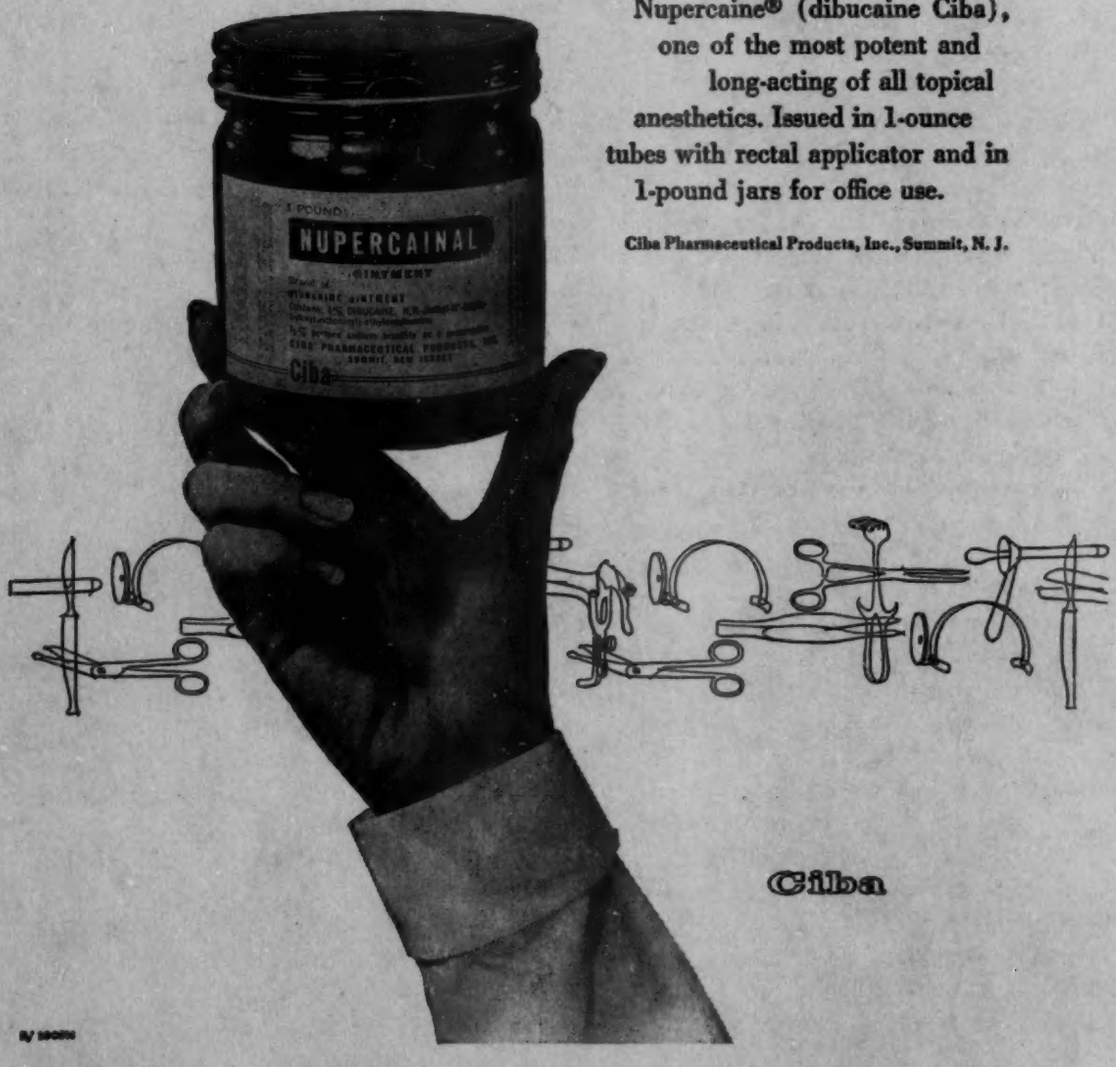

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